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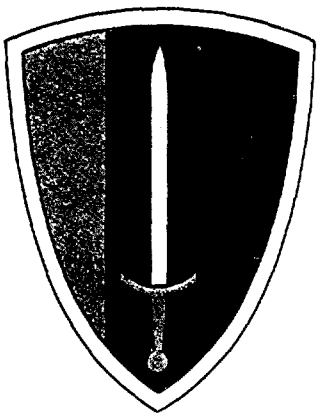
UNITED STATES ARMY VIETNAM



BATTLEFIELD REPORTS

A Summary of Lessons Learned

Prepared By

HEADQUARTERS US ARMY VIETNAM

Volume No. 3 May 1967

[redacted]

PREFACE

The "lessons learned" presented in this volume are extracts from fficial reports; they cover every facet of the stability operations n the Republic of Vietnam and present a digest of substantive comments f observers and commanders in operations, emphasizing lessons learned. ncluded in this publication are situations and solutions of interest nd educational value to all military personnel.

Vietnam as a whole is very nearly ideal for the type of warfare he communists are waging. On one side of this long, narrow strip of ountains, plateau, river delta, and seacoast is the South China Sea. n the other are the rugged, undeveloped, and largely mountainous froniers with three other countries--Communist China, Laos, and Cambodia.

Substantial areas of the interior are covered with dense tropical ain forest, giving concealment to secret installations and troop moveents. Much of the coastline is swamp or mountain, mangrove or forest, qually useful for those who would overthrow a government. The delta roduces an abundance of rice and is crisscrossed by a myriad of canals nd streams. Modern ground transport must use the single coastal raiload or the limited basic network of highways, all very easy to sabotage r ambush.

The people are equally well suited to this kind of war--most of hem are rice farmers, accustomed to hard work, meager rations, and the bsolute minimum of material comforts. Their philosophy is essentially atalistic and undemanding. They do not like war, yet Vietnam has known ar more war than peace in the 2,000 plus years of its history. Vietamese are known in Southeast Asia as energetic and aggressive, capable f sacrifice for an ideal (even the false ideals of communism). These ualities make them excellent fighting men.

As a fighting man, the communist enemy does not conform to any rigid actical doctrine and his techniques are unpredictable. Crafty and tough, e spreads a reign of terror while choosing the time and place to fight. t is imperative that every soldier "know the enemy," respect his ability, nd understand his weaknesses. It is equally important that we all profit rom "lessons learned."

This volume of "lessons learned" follows a previous effort published n June 1966. Volume IV, which will be published when available inforation is assembled, will cover the experiences from May to July 1966. he several volumes are designed to complement each other; however, no ffort is made to identify repetition of the same lessons.

Further information concerning subject matter in the USARV series, "Battlefield Reports - A Summary of Lessons Learned," may be requested from the Doctrine, Systems & Training Division, ACofS, G3, United States Army Vietnam, APO San Francisco 96307.

JOHN P. BROWN
Colonel, GS
ACofS, G3

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BATTLEFIELD REPORTS

A Summary of Lessons Learned

Volume III

(1 January - 30 April 1966)

Prepared By

Headquarters, US Army Vietnam

Section I

A SUMMARY OF LESSONS LEARNED
IN
"COMBAT OPERATIONS"

1. General Observations.

a. Employment of Tanks and Infantry.

"Item: Tank-Infantry Team Sweeps.

Discussion: Armored personnel carriers and tanks can be effectively employed in conjunction with sweeps by infantry in VN. The suppressive fires of the APC's and tanks reduce the dangers from sniper fire. Armored vehicles also detonate AP mines, thereby reducing casualties among the infantry.

Observation: Plans should consider the employment of APC's and tanks of the cavalry squadron during infantry sweep operations. Armor and infantry personnel must be trained in tank-infantry team tactics."

SOURCE: Headquarters, 1st Infantry Division

b. Effects of Weather on Tank Employment.

"Item: Dry Weather Employment of Tanks.

Discussion: Tank units may be used in many ways during dry weather, while mobility is favorable.

Observation: Tanks can be used for search and destroy operations, blocking forces, flank security forces, and reaction forces."

SOURCE: 2d Brigade, 25th Infantry Division

c. Technique for Destroying Rice.

"Item: Destruction of Rice.

Discussion: An extremely useful lesson learned concerns the destruction of rice, devised by the G5, 173d Airborne Brigade (Sep). Although every conceivable attempt is made to extract rice from operational areas, the size of captured caches and the lack of transport sometimes preclude extraction. As stated by one commander: "Under some situations it would be less expensive and more feasible to ship rice from Louisiana, than to extract the same amount from the jungle caches." In such cases, the rice must be destroyed to deny it as a ration for the Communist terrorists.

Observation: The 173d Airborne Brigade destruction method is as follows:

(1) Six-pound bags of powdered gas, CS-1, are placed among rice bags or within a pile of loose rice. The bags of CS-1 are tied with detonating cord and joined in series with detonating cord. The number of bags of CS-1 and the amount of extra explosives must be determined by experiment.

(2) Eight 110-pound bags of rice were contaminated using one 6-pound bag of CS-1. The 880 pounds of rice were examined after six days, which had included two torrential rains. The inspectors could not get close to the rice without suffering severe respiratory irritations. How long this rice will remain contaminated has not been determined at this time. However, residual effects were clearly evident after a period of ten weeks. Further inspections will be made."

SOURCE: Headquarters, II Field Force Vietnam

d. Analysis of Operations.

"Item: Commander's Analysis.

Discussion:

(1) Speed and aggressiveness in exploiting VC contacts, and thoroughness in the search of VC areas are essential to successful operations against the VC.

(2) The proper use of combined arms will produce the greatest number of VC casualties.

(a) Tanks and APC's should be used to immediately engage VC snipers, and move to make contact.

[redacted]

(b) Mounted sweeps alone will not produce results. Detailed foot-mobile searches must be conducted. Armored vehicles are best utilized in moving forward and destroying booby traps in order to reduce casualties to infantrymen. In addition, tracks can be used to clear densely vegetated areas.

(c) Rapid reaction of artillery and mortars is imperative. This can only be achieved through rapid and reliable reports of friendly unit locations.

(d) Artillery and mortar fires must be planned to cover all the flanks of units in defensive positions.

(3) Speed and thoroughness must be emphasized in village searches. In addition, National Police and ARVN interpreters should be used to facilitate operations of units in built-up areas.

(4) Units must be prepared for VC mortar attack at any time. When moving or resting, dispersion must be maintained. Commanders should insure that bunching does not occur. Troops must dig in, even in marshy areas. Night defensive positions should include overhead cover whenever possible. Soil or sandbags should be used to provide the individual with maximum cover from the front, flanks and rear.

(5) Units must clear their base defensive area of all snipers as soon as possible. At night, ambushes must be set around the entire perimeter to prevent VC from setting claymore mines or making a surprise attack.

(6) Extraction procedures in an airmobile operation are critical. A sweep around the loading zone should be conducted just prior to extraction. The security element must be deployed to block all approaches to the loading zone. Withdrawal of the security force outpost and, finally, the security force itself, to the loading zone, should be accomplished with speed and efficiency. A small command post element should remain and extract with the last lift. Use of gunships and preplanned artillery fires is mandatory.

(7) One staff officer, who will not be going on the airmobile operation, should be tasked with the project of preparing and supervising the loading zone for efficient reception of the combat troops. He is the ground force counterpart of the pathfinder teams from the aviation units. Routes, aircraft lead signs and guides must all be preplanned, pre-positioned and rehearsed. The formation and spacing of aircraft must be obtained from the aviation commander before a rehearsal. This rehearsal, involving all organic troops and attachments, will bring to the surface errors in the loading plan that may otherwise go undetected until D-Day. He should also arrange for police of the loading zone after the operation.

[redacted]

(8) Extensive preparations by artillery and air, beginning several days prior to an operation, may serve to warn the enemy and drive him out of an area before the operation begins.

(9) Plans for resupplying units by helicopter must include a detachment to secure the LZ, unload supplies and reload equipment when the helicopter returns. The detachment can catch up with the remainder of the company at a later time.

(10) 60mm mortars have been taken and used effectively on several occasions. The weapon's light weight, and particularly the light weight of its ammunition, make up reasonable, man-portable loads. This suggests that the weapon, with an appropriate ASR, should be added to the infantry battalion inventory. It is considered of great value, and is an excellent substitute for the 81mm mortar in airmobile operations, where considerable distance is to be covered in the subsequent ground maneuver and where resupply will be entirely by air. The M79 grenade launcher has not proved to be a substitute for the 60mm mortar because of limited range and bursting radius of the 40mm projectile.

(11) A perimeter should be protected during both its preparation and its occupation by the use of ambush patrols and anti-sniper teams.

(12) Personnel must be able to distinguish between probing fire and effective fire, and must be trained to withhold fire when being probed.

(13) Provision for an accurate muster must be made by commanders immediately upon return to base camp, before troops disperse for maintenance, mess and the like. In addition, an S1 representative, stationed at aid and clearing stations, should report all casualties by name and unit to the Bn TOC as early as possible.

(14) Units must be prepared to move and accurately report their locations, so gunships can engage close-in VC targets.

(15) Maximum utilization of aircraft is a must. Supply ships and command and control ships should retrieve POW's and slightly injured personnel whenever possible.

(16) US Forces can operate efficiently with ARVN forces without difficulty if close liaison is practiced.

Observation: As stated."

SOURCE: 2d Brigade, 25th Infantry Division

e. Detection of Enemy Positions.

"Item: Reconnaissance by Fire.

Discussion: In areas of dense undergrowth and brush, snipers, bunkers and trenches cannot be easily detected for more than a few feet.

Observation: Units should recon by fire in areas of hedge-rows and dense undergrowth."

SOURCE: 2d Brigade, 25th Infantry Division

f. Location of Maneuver Elements.

"Item: Visual Marking of Maneuver Elements.

Discussion: In a fluid operation in which there are no established lines except phase lines, a method of locating maneuver elements is needed.

Observation: When companies are moving by bounds, smoke placed at the flanks of the lead companies becomes a valuable visual reference on which to base the maneuver of the trail (reserve) company."

SOURCE: 2d Brigade, 25th Infantry Division

g. Use of Armored Personnel Carriers.

"Item: APC Shock Effect.

Discussion: Maximum shock effect with APC's has been obtained by immediately attacking the enemy at a high rate of speed.

Observation: This action appears to demoralize the enemy's will to resist."

SOURCE: 2d Brigade, 25th Infantry Division

h. Precautions Against Ambush of Track Vehicles.

"Item: Thorough reconnaissance must be made when moving heavy artillery and track vehicles.

Discussion: During OPERATION LINCOLN it was found that APC's, M48 tanks and self-propelled artillery could move very fast and surmount most obstacles. Since these tracked vehicles frequently returned from an attack via the same route, much greater attention was required on initial reconnaissance to determine likely ambush sites. Artillery concentrations were then registered on these sites - to the sides, the front, and the rear - as the column entered the area.

Observation: Likely ambush sites must be checked as a new area is entered. It is desirable to register concentrations to the sides, the front, and the rear of columns, to counter possible ambushes."

SOURCE: Headquarters, 1st Cavalry Division (AM)

i. Employment of Agent CS.

"Item: Use of CS crystals to Deny Ground.

Discussion: Because of physical inability of units on the ground to cover all possible exits, infiltration routes, and avenues of approach into objective areas, as well as a need to deny the enemy use of bunkers, tunnels and known ambush sites, the Brigade developed a need and a use for CS crystals.

Observation: Through coordination with the Brigade Chemical Officer and commanders on the ground, a method of seeding either by hand or by air delivery was developed. The air delivery system utilized a metal container and GP bursters, and proved 95 percent effective on target areas. Through use of the CS crystals the Brigade has been able to deny the enemy the use of the type areas mentioned for ten days or longer, depending on weather."

SOURCE: Headquarters, 173d Airborne Brigade (Sep).

"Item: Agent CS as a Supplement to Artillery Fires.

Discussion: During the battle of the Iron Triangle, entrenched enemy troop positions had resisted against artillery fire for over a day. Agent CS, delivered by helicopter and followed by artillery and rocket fires, was used to drive the VC from their entrenchments in a matter of about two hours, with three repetitions of the CS-artillery attack procedure. Also of interest, on one occasion during OPERATION LINCOLN

the VC did not leave their entrenchments. In this case, rocket fire was delivered immediately before, during and following the CS attack. It is possible that in this case the rocket fire was so intense that the VC suffered through the CS rather than chance leaving their entrenchments. The VC did cease firing at helicopters, though. From the latter case, it would appear that a sufficient pause must be allowed in rocket/artillery fires for the VC to feel he has a chance to escape the CS cloud.

Observation: This technique should be considered in the attack of any fortified area against unmasked personnel."

SOURCE: Headquarters, 1st Cavalry Division (AM)

"Item: Effective Use of Riot Control Agents (RCA) in Clearing Operations.

Discussion: During the MASHER/WHITE WING OPERATION, which occurred in a densely-populated area, CS hand grenades were used on larger suspect areas. This provided an opportunity to determine whether the occupants were merely civilians hiding, or were armed VC's. This technique aided in reducing the number of non-combatant casualties. On another occasion, 43 VC were pursued into a cave; all 43 exited the cave when CS hand grenades were thrown inside. Only one, who refused to surrender, was killed.

Observation: CS can be very effective for use in clearing operations in densely-populated areas and in confined spaces."

SOURCE: Headquarters, 1st Cavalry Division (AM)

2. The Enemy.

a. Viet Cong Offensive Planning/Execution.

"Item: The VC Tactic of 'One Slow Step; Four Quick Steps'.

Discussion: The tactic of 'One Slow, Four Quick' is used by the VC in battle planning for assault against built up defensive positions, or for ambush of moving columns of vehicles or dismounted troops. Tactical studies reveal the content of each 'step' to be substantially as follows:

(1) One 'Slow Step': The Viet Cong, in the first step, 'PREPARE SLOWLY', believing in thorough and deliberate planning before undertaking any tactical operation. They do not usually begin an operation that does not have an excellent chance of succeeding. In this first step, the tactical commander formulates his plans; studies the strengths and weaknesses of the enemy; evaluates the terrain; makes a map and ground reconnaissance of the area of operations; and plans his routes to and from his objective. The VC leader then withdraws his force to the rear, to a relatively secure area. Here he organizes his tactical elements and chooses a rehearsal site which is as nearly like the actual terrain of the planned operation as possible. He then rehearses the operation until every subordinate leader and individual is familiar with the terrain, his specific job, and can flawlessly execute his particular part of the operation. Only when the VC commander is convinced that the rehearsal is perfect does he decide to execute his planned operation.

(2) Four 'Quick Steps': This is the execution phase of the operation. In the first 'quick step', 'ADVANCE QUICKLY', the Viet Cong element moves from a relatively secure area and advances quickly, to minimize the possibility of detection, until it reaches the attack position near the objective. Immediately, the second 'quick step', 'ASSAULT QUICKLY', begins. In the assault phase, the VC use to maximum advantage the element of surprise, and mass a large volume of automatic rifle fire, recoilless rifle fire, or rifle grenade fire, on the objective (defensive positions or lead and trail elements of a vehicular or dismounted column) to halt and disorganize their opponents. They immediately exploit a successful attack and pursue their opponent, killing or capturing him. At this point the VC executes the third 'quick step' and 'CLEARS THE BATTLEFIELD QUICKLY'. In this phase, he collects weapons, ammunition and explosives, and destroys anything of value which must be left behind. Simultaneously, he evacuates the wounded and religiously carries off his own dead. Then, with orderly precision, the fourth 'quick step', 'WITHDRAW QUICKLY', begins. The VC move out over planned primary withdrawal routes, or alternate routes if necessary, while his tactical elements disperse into small elements to confuse and divide possible pursuit.

Observation: These steps, 'One Slow, Four Quick', are used by the Viet Cong to his advantage. For us to learn his tactics and use them to defeat him, is a must. We must learn to use the ambush patrol, and counter-ambush techniques, to perfection. We must ambush the Viet Cong ambushers, and kill the Viet Cong, for that is our mission."

SOURCE: Extracted from student handout, "Lightning" Ambush School, 25th Infantry Division

b. Viet Cong Fire Lanes.

"Item: Detection of VC Fire Lanes.

Discussion: The VC cut their fire lanes close to the ground. A man standing in secondary jungle growth cannot normally detect such fire lanes.

Observation: Personnel must squat down frequently and look for fire lanes, particularly when approaching a fortified position or suspected base camp area."

SOURCE: Headquarters, 1st Infantry Division

c. Operations Against VC Base Camps.

"Item: Attack of VC Base Camps.

Discussion: The VC normally evacuate their base camps when under attack; frequently, there are not enough VC defenders to man all defensive positions.

Observation: A wide, enveloping maneuver is the best type of attack for employment against VC base camps."

SOURCE: Headquarters, 1st Infantry Division

d. Viet Cong Use Sacred Areas for Concealment.

"Item: VC use religious installations as sanctuaries.

Discussion: The VC frequently use churches, pagodas, temples and graveyards for sanctuaries. They will also fight from these areas, where Americans are prone to be less alert, or where they do not search intensively because of their social training.

Observation: Personnel must treat all areas as suspect locations, regardless of social/religious significance, until the areas have been searched and cleared."

SOURCE: Headquarters, 1st Infantry Division

e. Rice Paddies Provide Concealment for VC.

"Item: Searching out the Viet Cong.

Discussion: The VC often hide in rice paddies, as well as adjacent weeded and overgrown areas, when the rice is thick.

Observation: The rice paddies themselves must be carefully searched."

SOURCE: 2d Brigade, 25th Infantry Division

"Item: VC Minefields.

Discussion: Contrary to previous reports, the Viet Cong do employ minefields of mixed AP and AT mines.

Observation: It cannot be safely assumed that an AP minefield will not contain AT mines, as well."

SOURCE: 2d Brigade, 25th Infantry Division

f. Locating Opposing Viet Cong Forces.

"Item: Viet Cong Security Measures.

Discussion: US and other Free World Military Forces (FWMF) have at their disposal quite sophisticated means of detecting enemy forces, and can place VC units in a general area. Specific pinpointing must be done by the soldier on the ground. VC security measures are quite stringent. Certain VC regiments have not been located for periods of time up to months, because of their strict discipline in maintaining a secure location.

Observation: Increased use of long range reconnaissance patrols will assist in the overall intelligence effort to locate VC forces."

SOURCE: Headquarters, 1st Infantry Division

3. Intelligence.

a. Handling and Processing of Prisoners of War (PW).

"Item: Evacuation of PW's and Captured Materiel.

Discussion: Consideration should be given in the planning stages of an operation to the best means for rapid evacuation of PW's, VC suspects, and captured enemy supplies, particularly rice.

Observation: Both helicopters and personnel carriers have been successfully employed for these purposes."

SOURCE: 2d Brigade, 25th Infantry Division

"Item: Employment of IPW Teams.

Discussion: The attachment of IPW Teams to organic battalions is impractical. Except on those occasions immediately following the capture or apprehension of VC's or suspects by the battalion to which the teams are attached, the services of the IPW Teams are lost to the Brigade at large. A more efficient use of these teams is to retain them at Brigade and dispatch them on a mission basis, to the requesting unit.

Observation: IPW Teams should be retained at Brigade level, under central control."

SOURCE: 1st Brigade, 101st Airborne Division

"Item: Intelligence Gathering Techniques.

Discussion: ARVN interpreters can be an invaluable aid to securing on-the-spot intelligence, as they have frequently recognized important VC documents carried by apparent civilians.

Observation: Predetermined question cards can conserve time and will simplify the questioning of VC suspects, to obtain EEI requirements."

SOURCE: 2d Brigade, 25th Infantry Division

b. Evaluation of Red Haze Missions.

"Item: Imagery Interpretation of Red Haze.

Discussion: Red Haze sensors have been known to record heat returns from burning and smouldering logs and tree stumps which could be misinterpreted as significant enemy activity. During the dry season in the Vietnamese Central Highlands, there is considerable intentional burning of fields for agricultural purposes. RH missions flown over an area on fire will image as a typical field fire. However, a mission flown over an area after the vegetation has been burned will often reveal numerous smouldering logs and stumps, producing an image that appears much like camp fires. The pattern and intensity of these returns may number 400 to 500 on a single mission.

Observation: Past experience has revealed that all heat returns on an RH mission are not necessarily of military significance. The images produced in the late stages of burning a field for agricultural use may often appear as camp fires, typical of military units preparing food. Imagery interpreters should consider this possibility when interpreting RH missions."

SOURCE: 45th Military Intelligence Company

c. Detection of Enemy Lines of Communication (LOC).

"Item: Detection and Identification of Trails.

Discussion: Certain phenomena are proving to be significant in the detection of VC and North Vietnamese Army (NVA) activity. Among these items considered indicative of military activity are: trail activity; apparent tracks; and ox cart or vehicle spoil. Items are initially recorded on overlays; coverage at a later date provides a comparison. This comparative coverage is useful as an indication of which base areas are inhabited, and also pinpoints infiltration routes and lines of communication. Trails not shown on existing maps are considered especially significant.

Observation: As stated."

SOURCE: 45th Military Intelligence Company

d. Reliability of VN Information Sources.

"Item: Local Intelligence.

Discussion: The reliability of local Vietnamese sources of intelligence information is questionable at best, and the vast quantities of their reports often make the intelligence picture difficult to develop. This is especially true when a unit is new in-country, and the situation improves only slightly after intelligence personnel have gained experience. There is generally a considerable disparity in information on VC and NVA order of battle between US and ARVN sources. This situation also exists among US units.

Observation: Extensive cross-comparison and fusion of all sources of information, at one location, will help eliminate misleading reports."

SOURCE: Headquarters, 1st Infantry Division

e. Requirement for Aerial Photography for RVN Operations.

"Item: Quick Response Aerial Photography for Use in Airmobile Company and Battalion Operations.

Discussion: Intensified employment of airmobility in RVN has resulted in a capability for the ground commander to take the action to the enemy, and fight him at a time and place of our own choosing. At the same time, intelligence and knowledge of the terrain to be negotiated by friendly forces has become more sketchy. Map coverage of RVN is notoriously inaccurate. Adequate and timely photographic coverage of proposed LZ's, approach and departure routes, potential hazards and dangers, and enemy emplacements is invaluable to the commander in his selection of a course of action. The use of photographs in pilot briefings greatly reduces the possibility of mishaps, by giving the pilot a degree of familiarity with the area prior to the operation. To date, response to requests for aerial photographic coverage has been so poor that commanders have had to plan in terms of days, rather than hours. Some of the reasons why this is so include:

(1) A definite shortage of darkroom processing facilities in RVN.

(2) O-1 Aerial Surveillance Companies have not received their KA-20 or KA-30A, electric motor-operated, pod-mounted cameras, although requisitions have been outstanding since organization of the units over a year ago.

(3) OV-1 companies are not responsive because they have been employed in a strategic role, rather than being responsive to requests of the lower tactical commanders.

(4) US Air Force high performance reconnaissance aircraft are often unsuitable for the type coverage desired, and response time for photo missions must be measured in terms of days.

Observation: In order to counter the shortage of photographic capability, several units have employed privately-owned 4X5 Polaroid cameras with good results. The obvious advantage of instant imagery far outweighs disadvantages such as no reproduction, enlargement or printing capabilities. The 12th Aviation Group has advised units to submit requisitions for this type camera, using USARV Form 47, and to consider including a Team FF, Still Picture Laboratory in future MTOE."

SOURCE: Headquarters, 12th Aviation Group

4. Operational Planning.

a. Planning for Airmobile Operations.

"Item: Positioning Troops Near the Operational Area.

Discussion: On numerous occasions, the operational area was located a considerable distance (45-50km) from the staging area. Long turnarounds resulted between lifts, causing a higher risk for forces in the objective area and prolonging the duration of the air movement phase.

Observation: Whenever possible, troops should be repositioned to a forward intermediate staging area, which will alleviate lengthy turnaround time and, thereby, achieve mass more quickly in the objective area, reduce risk, and decrease time to accomplish the air movement. If the Intermediate staging area selected is a prepared area, the repositioning should be accomplished by fixed-wing aircraft to conserve the more costly and critical helicopter."

SOURCE: Headquarters, 145th Aviation Battalion

"Item: Selection of Landing Zones (LZ's)

Discussion: In many instances, the landing zones selected by the ground elements were not suitable for helicopter operations. Ground units are not cognizant of obstacle restrictions, space requirements, angles of approach, and departure requirements.

Observation: It is mandatory that the air mission commander (or his representative) and the airmobile force commander jointly reconnoiter the proposed LZ's, preferably in the same helicopter."

SOURCE: Headquarters, 145th Aviation Battalion

"Item: Distribution of Ground Tactical Plan.

Discussion: Prior to conducting an airmobile assault, it is necessary that all supporting units be thoroughly familiar with the supported unit's ground tactical plan. This must be accomplished so that immediately responsive aviation support is available to the ground commander, during and after the airmobile operation.

Observation: Overlays of the supported unit's TAOR, objectives, and direction of movement must be provided to aviation units in time to incorporate the plan into aviation unit briefings."

SOURCE: Headquarters, 145th Aviation Battalion.

"Item: Use of Colored Smoke.

Discussion: Plans to assemble companies on the LZ using a particular colored smoke must be coordinated with the pathfinders at the LZ, who also use smoke to guide the helicopters into the LZ.

Observation: The pathfinder's smoke color must be determined beforehand, so that a different color can be used to guide units to assembly areas; otherwise, there is a risk of confusing subsequent lifts as the aircraft approach the LZ. Furthermore, white smoke is frequently used by ARVN units as a coordinating signal; to prevent confusion among US aircraft because of the "target designation" implications of white smoke, attempt should be made prior to combined operations to deter its use by ARVN units for other purposes."

SOURCE: 2d Brigade, 25th Infantry Division

"Item: Helicopter Troop Extraction.

Discussion: Extraction of troops by helicopter from the loading zone becomes more hazardous as the strength of the security force diminishes.

Observation: Coordination between the lift commanders and the ground elements must be accomplished early, preferably prior to beginning the operation, and must include preparation of a detailed fire support plan. The loading zone security force must be positioned in close proximity to the loading zone, but far enough out to prevent small arms and direct fire weapons from firing on the elements involved in the lift. Pathfinders should be in position a minimum of one hour prior to extraction time, to accomplish necessary coordination with the ground commanders, assist in positioning troops, and assist in preparing the loading zone."

SOURCE: Headquarters, 1st Infantry Division

"Item: Considering helicopter lift capability in resupply planning.

Discussion: Because much of the helicopter's flight time and cargo space must necessarily be committed to the transportation of food, fuel, water, and ammunition, it behooves the commander to plan ahead for his small (and often overlooked) repair parts, such as mantles for Coleman lanterns, batteries of all types, generators for fire units, and the like. These type items should be carried in quantity in the initial loadout, because they will be difficult to obtain later.

Observation: Rations, ammo and such are often supplied out of forward supply points that stock little else, and it is ridiculous to send an aircraft back to base camp, many miles away, to pick up something such as a mantle for a Coleman lantern. Careful planning in advance of airmobile operations will save much worry later on."

SOURCE: Headquarters, 1st Battalion, 30th Artillery

"Item: Use of Fire-Producing Ordnance in LZ Preparation Fires.

Discussion: Fires in the LZ are often started during the prestrike by aircraft and artillery. Armed helicopters sometimes start fires with the 2.75 inch rocket or tracer ammunition, while conducting fire suppression missions. The worst fires are started by napalm and white phosphorus (WP); the characteristic white smoke produced by WP is another serious hazard. Smoke makes it difficult for the armed escort helicopters to cover a landing formation. It often obscures the LZ, making a safe landing extremely difficult at best, impossible at worst. On occasion, the ground troops have been forced to abandon an LZ because of fires. In one instance, a disabled but only slightly damaged helicopter was completely destroyed by fires ignited by napalm during the prestrike.

Observation: When the area in and around an LZ is likely to burn, restrict the type ordnance to be used during preparation to that least likely to cause fire, i.e., fragmentation bombs, cannon fire, HE with fuse VT, and the like."

SOURCE: Headquarters, 52d Aviation Battalion

"Item: Identification of LZ.

Discussion: The procedure described below has become SOP. In a multi-lift operation it is often difficult for subsequent elements, flights or companies to locate the exact position of the LZ because of prestrike smoke and dust, or because of excessive time interval between aircraft flights.

Observation: This problem can be eliminated if the lead ship in each element drops yellow smoke on the LZ, upon departure."

SOURCE: Headquarters, 52d Aviation Battalion

"Item: Preparatory and Supporting Fires, Airmobile Assaults.

Discussion: Combat assaults must be well planned and coordinated with the Artillery LnO and the Air Force LnO, to insure that sufficient fire support is available. For example, when a landing zone is to be prepared by fire, the air strike should be scheduled from H-30 to H-15; the artillery preparation should be H-15 to H-5; and between H-5 and H-Hour, the armed helicopters should recon the LZ, mark the landing point, and place pathfinders on the LZ prior to arrival of the first troopships. When a combat assault is scheduled into an unprepared LZ, on-call fires by artillery and air must be preplanned. If armed helicopters find the LZ hot, the troopships will orbit out of the area while artillery or air saturates the LZ. The optimum altitude to fly in the operational area is 2,500 feet. This places the aircraft above effective small arms fire but allows the observer to perform his missions.

Observation: Careful planning for fire support and LZ preparation are critical to the success of combat assaults."

SOURCE: 2d Brigade, 25th Infantry Division

"Item: Use of the Helicopter by the Infantry Brigade.

Discussion: Army aviation gives the commander a much greater capability to reposition, reinforce or extract troops than he has ever had. This allows a smaller number of troops to search a larger area while maintaining a rapid reaction force if significant contact is established. The reaction force can be used to establish blocking positions or to pursue the enemy.

Observation: Armed UH-1B's provide the ground commander with immediate intelligence information and the capability of placing immediate suppressive fire on targets in the operational area. Normally, two light fire teams are used in support of the Brigade during combat operations. The team leader monitors on the Brigade Command Net, allowing him to be responsive to any unit in the Brigade. The armed helicopters should orbit every convoy and place suppressive fire on likely enemy positions. It should be pointed out that armed helicopter suppressive fire should be followed up by artillery fire or an airstrike. It is SOP in this unit for armed helicopters to escort resupply ships to and from forward resupply points."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

"Item: Use of trooper ladder during combat operations.

Discussion: During all operations in heavily wooded and mountainous terrain, the trooper ladder was used in operations ranging from squad size to entire companies. The trooper ladder is 36" wide series of aluminum rods arranged as a ladder on three 4000-pound tensile strength cables. Each ladder is 100 feet long and can be reeled from a hovering CH-47 or UH-1D to permit personnel to descend or ascend through very small holes in the jungle canopy. When desired two trooper ladders can be joined together with rappelling snap links through the loops at each end of the trooper ladders. The ladder has been used successfully both at night and during the daytime. Trooper ladders are issued to the aviation units and are operated by the aircraft crew members.

Observation: Units conducting airmobile operations should plan for the use of trooper ladders."

SOURCE: Headquarters, 1st Cavalry Division

"Item: Selection of Unlikely Landing Zones.

Discussion: During operation MASHER/WHITE WING advantages were gained by using unlikely LZ's located on ridgelines and pinnacles.

Observation: Experience proved that in using this technique, significantly less ground fire and hits on aircraft resulted."

SOURCE: Headquarters, 1st Cavalry Division

"Item: Helicopters used for Troop Exiting.

Discussion: When troops exit from helicopters the possibility of being hit by the rear rotor blades exists.

Observation: Upon exiting the helicopter, troops should take three or four steps and immediately hit the ground until the helicopter departs. This avoids the possibility for their getting hit by the rear rotor blades, gives the leader time for orientation before he moves off the LZ, permits the helicopter to fire suppressive fires, and clears the helicopter's takeoff route."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

"Item: Heavy Equipment Loading.

Discussion: Some troops carry heavier loads than others and have a difficult time during loading.

Observation: Heavily loaded troops should load last. This enables other troops in the helicopter to help load their gear. It also positions the heavier equipment near the door, facilitating rapid debarkation at the LZ."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

"Item: Security Force for Downed Aircraft.

Discussion: It is desirable to form a small reserve unit to provide security for downed aircraft. This prevents tasking a unit in the vicinity which already has a tactical plan and mission to accomplish.

A suitable solution developed was to keep a portion of the base security force on ground alert to provide security for downed aircraft.

Observation: Security for downed aircraft is essential and should be considered in all airmobile planning."

SOURCE: Headquarters, 1st Cavalry Division (AM)

"Item: Congested Landing Zones.

Discussion: Throughout the areas of operation in the Central Highlands, landing zones are often small and inadequate. Normal procedure for the US units that this battalion supports is to collocate the infantry battalion command post with a security force of company size and the battalion's direct support artillery battery. Upon initial occupation, the security force is placed in the LZ first. Thereafter, the remainder of the elements are lifted in. Where the LZ is small, subsequent lifts have become hazardous because of the congested conditions caused by CH-47's unloading artillery. This further reduces the usable area within an LZ.

Observation: During occupation of a small LZ, it was learned that all troop lifts into the LZ should be completed before the CH-47's are allowed to start lifting artillery. It is often necessary for the first troops in to improve the LZ by cutting away trees, bushes, etc."

SOURCE: Headquarters, 52d Aviation Battalion

"Item: Night Airmobile Operations.

Discussion: Elements of the group conducted seven night assaults during the reporting period.

Observation:

(1) Extensive aviation unit training is required.

(2) Detailed planning and coordination with all combat support elements is essential. Every contingency must be considered in the planning phase.

(3) Artificial illumination is effective and appreciably increases the probability of success. When artificial illumination is used, the

following factors are prime considerations:

(a) Once begun, illumination must be continuous.

(b) Illumination should begin two minutes prior to LZ time and continue two minutes after landing of the last wave.

(c) Illumination should be placed three kilometers past the LZ and 45' to the approach heading on the side opposite the direction the helicopters turn in leaving the LZ.

(4) When the tactical situation dictates and with sufficient training, night airmobile operations can be conducted safely and effectively."

SOURCE: Headquarters, 17th Aviation Group and Headquarters, 10th Aviation Battalion

b. Planning for Search and Destroy Operations.

"Item: Use of Jungled and Forested Areas by the Viet Cong.

Discussion: It has long been thought that because of their superior knowledge of these areas, the Viet Cong habitually establish base areas deep in the interior. Recent operations by this Brigade have tended to disprove this belief. Apparently the Viet Cong do not regularly inhabit the interior of dense jungle areas unless they are accessible by trail. Instead, they operate from bases within two to three kilometers of the periphery. When forced to retreat into the interior, the Viet Cong follow natural lines of drift such as streams.

Observation: Operations should be planned to cover all known existing trails and to block or search all streamlines, valleys, etc. Searches for base areas should be intensified along streams and trails and along the edges of heavily jungled areas."

SOURCE: Headquarters, 1st Brigade, 101st Airborne Division

"Item: Flush techniques were used effectively during Operation MASHER/WHITE WING by the 3d and 1st Brigades.

Discussion: About two-thirds of the forces take up well-concealed ambush positions covering natural routes into and out of the area. This ambush force is positioned by carefully chosen flight routes and deceptive

landings. The ambush force is prepared for 48 hours of operation without resupply. The remainder of the force is positioned to act as "beaters," moving towards the ambush forces. Based on observed movements away from the beater force, artillery and air interdiction is used on the routes between the beater and ambush forces, day and night. Flares and searchlights illuminate the area at night, thus permitting the Air Cav and other forces to continue surveillance and bring accurate fire on moving enemy forces. This keeps the pressure on the enemy and makes him very susceptible to Psy War.

Observation: As stated."

SOURCE: Headquarters, 1st Cavalry Division

"Item: Use of backtracking.

Discussion: A fundamental part of any search and destroy operation is denying the enemy access and use of terrain previously searched.

Observation: Periodically, after completion of an operation, an area should be reentered and searched again to insure that the enemy does not attempt to use it after friendly forces have left. In a number of instances this tactic has proven extremely profitable."

SOURCE: Headquarters, 3d Brigade, 25th Division

c. Planning for Use of Air Support.

"Item: Planning for use of unexpended CAS sorties.

Discussion: Aircraft ordnance must be expended before aircraft can land and refuel.

Observation: Planning must be continuous to provide suitable target locations for attack by aircraft reaching the end of their loiter time."

SOURCE: Headquarters, 1st Infantry Division

"Item: Employment of CH-47 aircraft. (Experienced by 52d Aviation Battalion)

Discussion: For the first time, this battalion has employed CH-47 aircraft, attached from the 1st Air Cavalry Division and the 147th Aviation Company (AML). The capabilities that this aircraft possesses are essential to the aviation support required by the US units supported during this reported period. In addition to their primary role of lifting and resupplying artillery, they have been of immeasurable value to this battalion by providing immediately responsive aircraft recovery. On several occasions, recoverable aircraft would have been lost had they not been quickly recovered by the CH-47's. For one portion of OPERATION LINCOLN, the CH-47's were detached from this battalion and made available on a mission request basis to the supported infantry brigade. This created certain problems in coordination and planning over which the aviation battalion commander had no control. Support was not as responsive as desired by the brigade and, at one time during the occupation of a small LZ, aircraft landing was disrupted by the unexpected arrival of three CH-47's which were performing the artillery lift into the same LZ.

Observation: That all Army aircraft with the possible exception of "Dust Off" be under the operational control of the aviation commander responsible for aviation support to the operation."

SOURCE: Headquarters, 3d Brigade, 25th Infantry Division

"Item: Combat Support Coordination Center (CSCC). (Experienced by 10th Aviation Battalion)

Discussion: OPERATION JEFFERSON and OPERATION VAN BUREN were conducted by elements of United States, Korean and Vietnamese military forces. Language barriers presented substantial problems in combat support coordination, particularly in the area of aviation support. The establishment of a CSCC, consisting of combat support elements of all three countries, provided immediate personal contact between all elements for coordination and exchange of information.

Observation: A Combat Support Coordination Center is essential to combined or multi-national operations."

SOURCE: Headquarters, 3d Brigade, 25th Infantry Division

d. Planning Considerations - Support of Special Forces.

"Item: Support of Special Forces Camps in Remote Areas.

Discussion: During the battle of A SHAU, sufficient tactical and logistical support was prohibited due to extremely poor weather conditions (extended periods of low cloud cover and limited visibility) which are prevalent most of the time in the vicinity of Camp A SHAU, located within the A SHAU-ALOUI Valley, adjacent to the Laotian border. These conditions placed severe limitations on the use of direct air strikes, bombing, resupply and medical evacuation efforts and the ability to place effective fire on enemy mortar positions. The enemy employed the tactics of placing their troops and anti-aircraft weapons (.50 cal MG) along likely avenues of approach of friendly reinforcements. The enemy had the advantage of short and relatively secure supply lines resulting from established infiltration routes from Laos, adjacent to Special Forces camps located near the Laotian border.

Observation: Contingency plans are being established with FWAF and ARVN units to support the Special Forces to include:

(1) The use of "Sky Spot Bombing" (an electric radar and homing device; UHF/ADF, AN/PRC 41 and COMPUTER MSQ-35) to allow direct bombing on targets under extended cloud cover.

(2) Airlift mobile artillery units should preplan landing zones around the periphery of the enemy exits to render support to friendly forces.

(3) Establish primary and alternate voice communications system to act as relays for the camps when communications are restricted.

(4) Deploy reinforcements to camps in advance of imminent attacks based on timely intelligence and weather conditions.

(5) Border surveillance efforts must be increased (air and land) in order to detect the enemy massing for a large scale attack.

(6) The timely reinforcement by conventional units, both ARVN and US. Ground routes for reinforcements must be planned in areas where weather conditions are likely to preclude flying.

(7) A camp should not be established in an area which is well beyond reinforcement distance and capability of friendly units. This is particularly true in areas, such as A SHAU, where poor weather conditions exist most of the time."

SOURCE: Headquarters, 5th Special Forces Group

e. Planning for Mounted Operations.

"Item: An Armored Task Force combined with airmobile elements can be extremely successful.

Discussion: During OPERATION LINCOLN the 3d Brigade, 1st Air Cavalry Division, and elements of the 25th Infantry Division maneuvered a task force of artillery, APC's, tanks and airmobile forces throughout Pleiku, Chu Pong, Plei Me and Duc Co areas, conducting link-up and reconnaissance operations using the armored elements for ground fire superiority and using helicopters as the eyes of the task force. No trafficability problems were encountered even though there were no roads in the area. The soil in these areas seems to absorb rain and dry quickly. The use of armor and airmobile forces added a tremendous increment to the overall ability to exploit success since the availability of resupply for ammo, POL and reinforcements permitted almost unlimited range for the armored elements, while the airmobile elements enjoyed the advantage of the great ground firepower of the armored elements.

Observation: When both armored and airmobile forces are available, consideration should be given to their use in combined task forces."

SOURCE: Headquarters, 1st Cavalry Division (AM)

"Item: Tanks and self-propelled artillery can be very effectively used to create helicopter landing zones in lightly wooded areas.

Discussion: During OPERATION LINCOLN, M-48 tanks and self-propelled artillery were used as part of a mechanized-airmobile team. When a landing zone was needed for ammunition or POL resupply the tracked vehicles merely ran down a few trees, made several quick turns and thus developed a hasty LZ. This technique permitted almost unlimited armor operations since airmobile reinforcements and aerial resupply could always be effected.

Observation: When tracked vehicles are available, consideration should be given to their use in creating hasty LZ's for refueling, resupply and reinforcing."

SOURCE: Headquarters, 1st Cavalry Division (AM)

"Item: Use of Trailers on Mechanized Operations.

Discussion: By employing trailers, a mechanized infantry battalion is capable of operating for three days in a search and destroy operation, completely mounted on tracks, with only water being resupplied.

Observation: Ammunition trailers pulled behind APC's stood up well but the 1½ ton trailers received rough treatment when so used."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

"Item: Positioning of Patrols.

Discussion: Patrols and ambushes have been planned and dismounted at designated ambush sites by platoons or companies conducting mounted sweeps in an area of operations.

Observation: The enemy is often unable to detect that troops have dismounted from an APC."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

f. Planning for Security Operations.

"Item: Mortar attack on airfield.

Discussion: A recent mortar attack against an airfield provided the following lessons:

(1) An observation aircraft was employed for four hours per night on airfield surveillance. The attack occurred shortly after the aircraft landed. As has been amply demonstrated by this and other incidents, the VC will take advantage of inflexibility or sterotyped action on our part.

(2) No patrols or listening posts were employed. The limitations of countermortar radar and the difficulty in observing mortar fire make it essential that patrols and listening posts be established.

(3) Primary communications were knocked out by the first rounds received. It is imperative that adequate back-up communications be established.

(4) Initial attack was from the north. This firing ceased when the main attack commenced from the east and southeast. Commanders must be prepared for diversionary actions.

(5) An observation aircraft on alert was scrambled on initiation of the attack. The aircraft experienced engine failure due to unobserved damage which was received on the ground. Special measures such as revetments should be employed to protect alert aircraft.

Observation: Since aircraft resources are a primary target for VC attack, commanders will exploit the foregoing lessons in connection with measures to deter such attacks in the first instance, and to cope with them effectively should they occur."

SOURCE: Headquarters, 12th Aviation Group and Headquarters, 13th Aviation Battalion

"Item: Night Airfield Security (flare) Missions.

Discussion: Mortar attacks on installations are based on the schedules and flight routes for flare dropping aircraft. The establishment of a set time pattern or routine on flare missions provides the VC with an opportunity of selecting a time when an installation is most vulnerable to attack. Some recommendations are:

(1) Coordinate times between units flying the flare missions to insure no excessive gaps or overlaps in time.

(2) Vary time schedule between 2100 hours and 0300 hours.

(3) Avoid flying a fixed pattern over installation, i.e., circles, figure "8's," etc.; vary flight pattern.

(4) Concentrate majority of observation on likely avenues of approach of VC and on likely mortar positions.

Observation: All aviation units, located at installations where they are required to provide all or a portion of their airfield defensive security measures, should be advised of these suggestions learned through experience."

SOURCE: Headquarters, 13th Aviation Battalion

"Item: Reconnaissance of Prospective Operational Areas.

Discussion: Excessive aerial reconnaissance and tactical air activity prior to entry into an operational area only warns the VC of impending operations. A system of controls must be used which restricts such activity strictly to that which is deemed essential for planning purposes.

Observation: All requests for reconnaissance and tactical air should be passed through the S2. He should carefully weigh these requests in light of the need for information, and against the requirement to maintain such activities at a "normal" level prior to the beginning of an operation."

SOURCE: Headquarters, 1st Brigade, 1 Airborne Division

"Item: Patrolling/Perimeter Defense.

Discussion: Recent experience indicates that the greater majority of the mortar attacks on the airfields at Tan Son Nhut, Phan Thiet, and New Pleiku as well as the numerous mortar attacks on base camps, CP's, outposts, and villages have been conducted with the 81 or 82mm mortars. There also have been many instances of base camps and CP's being infiltrated by a few VC who planted satchel charges, threw grenades, and used small arms.

Observation: Since the range of the 81 or 82mm mortars is slightly over 3000 meters, aggressive patrolling around base camps, airfields, and CP's out to 4000 meters would preclude many mortar attacks, reduce the infiltration, and lead to the killing or capturing of enemy personnel and equipment."

SOURCE: Headquarters, I Field Force Vietnam

g. Planning for Search and Clearing Operations.

"Item: ROAD RUNNER Operations.

Discussion: During ROAD RUNNER Operations, the Bde has experienced difficulty, when encountering a VC tax collection point, to kill, capture, or identify the VC, as they have preplanned escape routes or mingle with the civilians.

Observation: In conducting Anti-VC tax collection operations, it is absolutely necessary to make both a detailed map and air recon of the area, in order to seal off all likely escape routes. It is also necessary, when a tax collection point is dispersed, to conduct a thorough search of the surrounding area to discover any caches of supplies taken from the VN people."

SOURCE: Headquarters, 173d Airborne Brigade

"Item: Techniques for Village Search.

Discussion: Momentum in searching villages can be lost when a detailed search is accomplished by lead elements. This method provides the enemy time to hide documents or personnel.

Observation: The two leading platoons, in a company-sized operation, should quickly search houses for personnel and the reserve platoon should search the houses in more detail for documents. This method maintains the forward momentum of the operation and insures a thorough search."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

"Item: Employment of Flamethrowers.

Discussion: Flamethrowers have a definite role in operations of a clearing nature or a destruction nature.

Observation: Both portable and mechanized flamethrowers have been used to clear brush and jungle areas. The hottest flame is obtained by spraying diesel oil and then igniting. Napalm is not as effective as diesel oil for burning brush. The mechanized flamethrower has been effective in discouraging enemy snipers. Its demoralizing effect on the enemy's will to resist is unquestionable. The limited firing time of the mechanized flamethrowers may be overcome by employing them in pairs and by firing short bursts. It is especially important to employ mechanized flamethrowers in pairs when they are operating at a distance from supporting elements.

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

"Item: Clearing roads and trails of mines.

Discussion: The clearing of roads and trails of VC mines is only a temporary measure unless continuous surveillance is maintained over the area. Experience has shown that the VC will return and replace the mines at the first opportunity.

Observation: Roads previously cleared should not be considered secure unless constant surveillance had been maintained on the road or it is swept for mines immediately prior to being used."

SOURCE: Headquarters, 1st Infantry Division

"Item: Use of the Mighty Mite.

Discussion: This piece of equipment has a definite use in tunnel warfare but is limited in its function.

Observation: The Mighty Mite Portable Blower has been used to blow smoke through tunnels to locate hidden entrances. It has also been used to blow fresh air into tunnels during tunnel exploration by tunnel teams. Operators for this equipment are easy to train since the equipment is simple to operate. Generally, the Mighty Mite is ineffective in flushing personnel from tunnels as the Viet Cong construct air traps and breather holes against this tactic."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

"Item: Incomplete tunnel destruction.

Discussion: In many cases, tunnels were too extensive to be explored and destroyed in the same day. Consequently, on some occasions, the VC mined entrances and approaches during the night, after the tunnel team departed.

Observation: When a tunnel complex cannot be completely searched and destroyed in one continuous operation, all entrances should be marked in such a way as to indicate VC use in the interval between departing and return of friendly forces to complete destruction."

SOURCE: Headquarters, 1st Infantry Division

h. Planning Ambush/Counter-Ambush Operations.

"Item: Repeated use of ambush site.

Discussion: During the early phase of OPERATION LINCOLN north of Duc Co, 1/12 Cavalry Battalion caught 12 enemy personnel walking across a stream with no security. In the succeeding three days, several more personnel were caught in the same ambush. From this experience, it appears that the enemy does not have an effective means of communicating to his troops, who are enroute, the location of our ambush sites. Once a good ambush site is used, it may not be necessary to move it if suitable supporting fires are available to secure it.

Observation: It is not always necessary to move a good ambush site after each successful ambush, particularly when operating along infiltration trails."

SOURCE: Headquarters, 1st Cavalry Division (AM)

"Item: Night Defense Equipment.

Discussion: As foot mobile infantry are not able to carry enough mines, detection equipment, flares, etc., on cross-country operations, an alternate means of providing these items for night defense must be developed.

Observation: An overnight box containing trip flares, claymores, Starlight devices, sniper scopes, etc., should be packed ahead of time and be brought forward in the late afternoon by helicopter.

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

"Item: Aerial observation, follow-up actions and artillery marking rounds are important tools in ambush and counter-ambush that should be considered.

Discussion: The follow-up actions are just as important as those establishing an ambush. After the ambush has been sprung, the force should remain in place, locate and search bodies, secure enemy weapons, and if practical, cover the bodies by fire so that VC attempting to evacuate casualties are hit. Patrols can and should plot their ambush site as a concentration and fire upon it after returning to their lines. Maximum

use of air observation by fixed and rotary wing aircraft should be planned in conjunction with troop movements. These aircraft should carry trained forward observers who are capable of the dual role of detecting and marking possible ambush sites and of adjusting artillery fire on any resulting targets. Aerial observation should be available for the entire operation. All personnel should also be aware of the possibility of ambushes occurring after the release of aircraft and observer.

Observation: As stated."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

5. Communications.

a. Employment of VHF Equipment.

"Item: Modification of signal equipment to provide greater mobility and flexibility.

Discussion: TOE VHF equipment (AN/MRC-69) has proven to be extremely bulky and cumbersome in providing support for airmobile operations. Additionally, aircraft requirements become excessive. One sortie is required to move only the shelter and internal equipment; second lift is required to displace the generator set, a component of the AN/MRC-69. The AN/MRC-69 provides 24 VHF channels of communication. Twelve channels are normally sufficient to support a brigade-sized task force. Areas with dense jungle growth often require the equipment to be deployed and placed in the forward LZ itself. The equipment loses all mobility once it is placed on the ground. Once the 45-foot antenna masts are erected, a potential hazard exists for air traffic in the area. In addition, repositioning equipment by aircraft sling, into inaccessible area, often means the difference between a marginal and a quality communication system.

Observation: Modification of a portion of the forward platoon's VHF equipment will produce the desired mobility and flexibility. By removing half of the equipment from an AN/MRC-69 and installing it in a 3/4 ton trailer, considerable weight reduction results, thereby allowing the generators to be airlifted in the same sortie. In addition, all ground mobility is not lost. Remounting the equipment into an open 3/4 ton trailer has the secondary advantage of providing improved air circulation around the equipment which will significantly reduce equipment failure due to excessive heat. Excellent results have been obtained from a test model."

SOURCE: Headquarters, 1st Infantry Division

"Item: Numerous radio relay test shots should be attempted.

Discussion: Prior to an operation, a VHF test shot was attempted from Dak To to Pleiku, with a relay at Kontum. It was later discovered that a reliable system could be operated directly without the Kontum relay.

Observation: When a VHF test shot is being attempted, all possibilities should be tried, even those which appear by map profile to be impossible. When possible, a systematic program of VHF test shots should be run for future use; such tests should be thoroughly documented for future reference."

SOURCE: Headquarters, 5th Signal Battalion

"Item: Line of sight for VHF communications.

Discussion: VHF communications is designed for line of sight operations between stations. This battalion is not able to establish line of sight between the Battalion Operation Center at Cam Ranh and D Battery in Nha Trang due to a land mass obstructing the view.

Observation: Reorientation of the A- Band antennas to make use of obstacle gain (a large landmass refracts or bends the VHF beam) has provided a clear, reliable shot between these two stations."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

"Item: Radio Relay Utilization.

Discussion: Undesirable communication sites are frequently encountered in the flat and heavily forested areas in Vietnam. Utilization of a suitable VHF radio relay can extend the effectiveness of VHF equipment far beyond the normal line of sight range of 30 miles.

Observation: Plans for operations must include provision for VHF radio relay units."

SOURCE: Headquarters, 1st Infantry Division

b. Moisture in Signal Cables.

"Item: Moisture in multi-pair cable hooks.

Discussion: Hooks in tactical, multi-pair cable have been highly unsatisfactory for use in RVN. Cable pair cross-talk and short circuits have been traced directly to this source of trouble. This problem is not solely the result of hard, driving rain storms in RVN; it is the result of condensation. The temperature/humidity differential is such in RVN to make this a very difficult problem. Sealing the hooks externally has been attempted, but only tends to increase condensation. Open hooks, on the other hand, are not desirable either. The problem of condensation would be solved, but the combination of rain and dust would only intensify the problem over a period of time.

Constant draining of moisture from hooks appears to be the only immediate solution to problem. This is a poor solution since it is time consuming and interrupts service completely while the contacts are cleaned and dried.

Observation: Further research is required for a suitable hook for tactical cables. One-piece commercial cable is a solution for non-tactical cable."

SOURCE: Headquarters, 1st Infantry Division

c. Signal Communications in Jungle Terrain.

"Item: Signal attenuation by jungle vegetation.

Discussion: Signal absorption by jungle growth has a marked affect upon communications in RVN, in the VHF bands. In some instances, the 45-foot antenna masts (components of the AN/MRC-69) do not provide sufficient height to clear the jungle growth thereby causing a noticeable loss of transmitted signal strength at the receiving end.

Observation: VHF relay points have been established on dominant mountains (elevations of 1100 and 3500 feet) with excellent results."

SOURCE: Headquarters, 1st Infantry Division

d. Communications/Radio Frequencies.

"Item: Congestion of Radio Frequencies.

Discussion: All radio frequencies are extremely crowded. Utilization of the AN/VRC-12 series FM radio has relieved the problem to some extent in the FM band. However, these sets have an increased operating range, and the significant reduction in congestion and interference may be nullified due to unwanted reception of distant stations.

Observation: All units should be encouraged to operate the AN/VRC-12 family radios on high power only when FM communication cannot be established on low power."

SOURCE: Headquarters, 1st Infantry Division

e. Division Headquarters Switchboards.

"Item: The Central Office Telephone, Manual, AN/MTC-3 is inadequate for support of a division headquarters.

Discussion: The AN/MTC-3 contains facilities for only 120 circuits, i.e., two each telephone switchboards SB-86/P. Telephone requirements exceed the switchboard capabilities. Also, the SB-86/P's require constant maintenance, especially for faulty line cords and spring activated packs for rewinding the line cord. During periods of repair associated circuits are unusable.

Observation: The Central Office Telephone, Manual, AN/MTC-3 was replaced with the Central Office Telephone, Manual, AN/MTC-1 which provides facilities for terminating and interconnecting 200 local or common battery subscriber circuits. Further, it requires far less maintenance than the MTC-3. Common battery capability speeds calls and permits use of telephones other than the TP-312 which requires frequent checks of its batteries."

SOURCE: Headquarters, 1st Infantry Division

f. Air-Ground Communications.

"Item: Establishment of adequate communications from air to ground using the AN/PRC-25 Radio.

Discussion: When a command and control helicopter is not available, a helicopter without internal radios for use by the troop commander must be used for command and control or relay purposes. In such cases, the normal solution is to use the AN/PRC-25 Radio with short antenna. This solution has proved unsatisfactory.

Observation: Certain helicopters are equipped with an antenna mounted on the outside of the ship. This antenna has a connecting cord and an antenna adapter that will fit the antenna adapter receptable on the AN/PRC-25 radio. Use of this external antenna gives the AN/PRC-25 radio a capability equal to or surpassing that of the console radios in the Command and Control Helicopter. A helicopter so equipped is actually better in some respects than a Command and Control helicopter because the absence of the console affords the passengers considerably improved visibility, and the reduction in weight increases the maneuverability and performance of the helicopter."

SOURCE: Headquarters, 1st Brigade, 101st Airborne Division

g. Improvised Long Range Communications.

"Item: Lightweight long range radio mobile platform.

Discussion: To solve the problem of long range communication between Battalion and Brigade headquarters, the "Talking Mule" has been developed. It consists of two AN/VRC-442, and four storage batteries, all mounted on an M-274A1 ½-ton "mule." In use, the "Talking Mule" has enabled commanders to communicate over far greater distances that would be possible with the AN/PRC-25 radio; yet its light weight enables it to be carried by UH-1D helicopter. On the ground, the vehicle is able to traverse almost any kind of terrain, and can accompany the commander wherever he goes or wherever he desires to establish his command post.

Observation: In spite of its success, it is recognized that the "Talking Mule" is only an innovation. Continued measures should be taken to develop, evaluate and issue a standard lightweight portable radio capable of communicating over extended distances in any type of terrain."

SOURCE: Headquarters, 1st Brigade, 101st Airborne Division

h. Airmobile Assault Communications/Radio Nets.

"Item: Separate radio nets for simultaneous air assault and land movement.

Discussion: The volume of traffic becomes too heavy for one net when an airmobile assault takes place simultaneously with the movement of landtail elements.

Observation: Separate radio nets should be established, when frequencies are available, for use by air assault and landtail elements."

SOURCE: Headquarters, 1st Infantry Division

i. Alternate Battalion Communications.

"Item: Backup Communication Net Outside the Battalion.

Discussion: Primary means of communication between this battalion Operation Center and 97th Artillery Group AADCP is by two sole-user VHF/Microwave/Tropo circuits. These sole-user circuits have been approximately 85% reliable due to break-down somewhere along the several connecting stations. An alternate means of communication is necessary as a backup to insure maximum reliability between these two points. Collins Single Sideband radios (KWM-2A) have been implemented to fill this need for a backup.

Observation: This single sideband radio has given very reliable service and provides reliable backup communications between the battalion Operation Center and 97th Artillery Group AADCP."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

j. Physical Security for Communications.

"Item: Protection of Communications.

Discussion: During the battle of Camp A SHAU in I Corps, it was determined that the coaxial cable lead-in from the antenna to the radio set had been cut by an unidentified individual within the camp. The cutting of the cable severed communications with higher headquarters for a period in excess of eight hours. Positive steps which can be taken to eliminate similar instances are:

(1) Erect a land pipe to a height six to seven feet above ground level and run the coaxial cable through it. This will prevent cutting and afford some protection against ground and mortar fire.

(2) An underground or indoor type antenna should be installed for emergency use, and periodically checked for reliability.

(3) The installation of dummy antennas will confuse saboteurs and enemy gun crews.

Observation: All camps have been notified to take necessary precautions to preclude the sabotage of all communication equipment and associated accessories."

SOURCE: Headquarters, 5th Special Forces Group

k. Switchboard SB-22.

"Item: The Switchboard SB-22 can be used as a reliable substitute for the SB-86.

Discussion: Because of the malfunction and deterioration of the Brigade's SB-86's, use was made of stacked SB-22's as an expedient replacement. Continuous use of the SB-22's during the entire period of this report did not result in a single wire "outage" attributable to switchboard malfunction.

Observation: The SB-22 has proven more reliable than the SB-86 for operation in Vietnam. This is conditional, however, because the SB-86's referred to were all old boards and had been rebuilt several times. We have recently begun using new SB-86's, and will continue evaluation of the relative merits of both types of switchboards."

SOURCE: Headquarters, 1st Brigade, 101st Airborne Division

l. Use of AN/VSC-1 for Long Range Communications.

"Item: Radio Set AN/VSC-1.

Discussion: Prior to January, little if any use had been made of the AN/VSC-1 to assist in long range communications. The assumption was that the radios could not be made to work. However, after continued emphasis and effort on the part of the communications personnel involved, these radios have been made to work satisfactorily, and have been used to tie together PHAN RANG, TUY HOA, PHAN THIET, and NHON CO with excellent results.

Observation: Although obsolescent, the AN/VSC-1 will still provide reliable communications if the proper emphasis is placed on maintenance and operation."

SOURCE: Headquarters, 1st Brigade, 101st Airborne Division

6. Training.

a. Training at Base Camp Sites.

"Item: Requirement for Small Unit Training.

Discussion: Unit training must be maintained in Vietnam. Daily operations provide a form of training, but are insufficient to plan for a constantly changing military situation. Training guidance must be firmly established through the chain of command. Implementation of training must be at the site level. Command supervision and support must be provided. Requirements must be realistic and simple because the training time very often competes with operational requirements which must take precedence.

Observation: Staffing at small sites must take into account the requirement for small unit training. Noncommissioned officers must be capable of conducting the training since some sites are not authorized officer personnel. Recognition for training achievements must be provided."

SOURCE: Headquarters, 2d Signal Group

b. Training/Imagery Interpreters.

"Item: Preparation of Mosaics and Photo Maps.

Discussion: Contrary to service-wide consensus, 9x9 and 9x18 inch photographic formats will continue to be required for the preparation of uncontrolled and controlled photo maps for airmobile operations.

Observation: Imagery interpreters and engineer topographic units should be fully trained in the preparation of uncontrolled and controlled photo mosaics respectively."

SOURCE: Headquarters, I Field Force Vietnam

c. Training/VC Tunnels

"Item: VC Tunnel Discovery and Exploitation.

Discussion: The VC has constructed extensive tunnel systems throughout Vietnam over the past 12 years. Many of these tunnel systems are located

in areas previously immune to operations by Vietnamese and FWMAF units. Many are also well concealed by the vegetation that has overgrown the openings.

Observation: Each battalion should organize and train a tunnel team to exploit the discovery of tunnel systems. These teams should be trained in the use of bulldozers and front loaders in conjunction with riot control agents and explosives as a means of sealing off tunnels, destroying trench works, and denying their use by the VC."

SOURCE: 1st Infantry Division

d. Training/Mine Detection.

"Item: Unmarked mine fields.

Discussion: Throughout the country, there are many areas that contain unmarked friendly mine fields as well as areas which have been mined by the enemy. It is essential, therefore, that units sweep all areas prior to occupation.

Observation: All units should hold periodic refresher classes for their personnel on the detection of mine fields, and all areas should be swept for mines prior to occupation."

SOURCE: Headquarters, 3/18 Artillery

e. Training/Radar Personnel.

"Item: Training of Radar Maintenance Personnel.

Discussion: In general, radar repair technicians are not adequately trained to perform required repairs on the various types of radar positioned in RVN. A study by this directorate in conjunction with personnel from USAECOM revealed that too much training time was spent on theory at the expense of practical trouble-shooting.

Observation: More time should be spent on practical application covering the various types of radars during the training period."

SOURCE: 1st Logistical Command

g. Training/Driver Personnel.

"Item: Cross training of personnel.

Discussion: Units of the battalion are not manned to provide drivers and operators for sustained 24-hour operation of trucks and equipment.

Observation: Cross training of all personnel of engineer operating squads in driving 5-ton dump trucks and an augmentation in the number of operators assigned to the equipment sections is necessary for two-shift operation."

SOURCE: 20th Engineer Battalion (CBT)

h. Training/Emphasis on Preventive Maintenance Procedures.

"Item: Excessive wear on radiator, tractor, FT, Allis Chalmers.

Discussion: Operation under sand conditions produces great wear on radiator tubes causing pinhole leaks.

Observation: If armored core radiators are not available, drivers must be cautioned, when walking equipment, to drive forward, not backward, thereby reducing the amount of sand and dust pulled into the radiator."

SOURCE: 20th Engineer Battalion (CBT)

Section II

A SUMMARY OF LESSONS LEARNED IN "COMBAT SUPPORT OPERATIONS"

1. General Observations.

a. Convoy Control.

"Item: Lack of an agency for the regulation and control of highway traffic in support of OPERATION MASHER/WHITE WING during January 1966.

Discussion: Since normal highway traffic regulation and control in II CTZ was non-existent, a concept for regulating and controlling military convoys on Hwy #1 between Qui Nhon and Bong Son was developed in coordination with G4. The concept included the establishment of a I Field Force Vietnam Traffic Headquarters at Qui Nhon, regulating and control posts at several strategic locations, and military police patrols on the highway. To insure adequate control of all elements, representatives of I Field Force Vietnam, ARVN II Corps, Cap ROK Inf Div, 1st Air Cav Div, USASC Qui Nhon and the 504th MP Bn participated in the regulation and control of the traffic. All military police patrols and traffic posts were composed of two or more nationalities. Thus, by thorough planning, coordination, and effective liaison, a single agency involving several nationalities was established to accomplish a given mission.

Observation: Where traffic regulation and control involves forces of various nationalities, each must be represented in the traffic headquarters and at control points."

SOURCE: Headquarters, I Field Force Vietnam and Headquarters, 3d Brigade, 25th Infantry Division

b. Mortars in Support of Artillery.

"Item: 81mm Mortar Illumination.

Discussion: 81mm mortar illumination as described in FM 20-60 greatly enhanced the physical security of the Battery tactical site. Two preplanned concentrations provided excellent illumination of all avenues of approach.

Observation: It was necessary to run a special wire line directly to the US Advisor located at the CIDG mortar position south of Nha Trang to insure that desired fire missions were timely. Fire support became immediately available using this system of communication."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

c. Mobile Illumination for Defense.

"Item: Use of the 18-inch 2.2 KW Xenon Searchlight mounted on a ¼-ton truck.

Discussion: Although the Engineer Research and Development Laboratories have developed modifications to the ¼-ton truck for mounting the 2.2 KW Xenon Searchlight, this unit has made further modification by mounting the searchlight on a 106 Recoilless Rifle Mount. This mount facilitates placing the searchlight on the ground and remoting it from the vehicle. The searchlight in this configuration has been employed as a mobile means of illumination for perimeter defense, e.g., several alternate positions are selected; operational control of the searchlight is given to supported infantry battalions; and light direction is coordinated by zone.

Observation: That consideration be given for issue of 18-inch, 2.2 KW Xenon Searchlight to infantry units for perimeter illumination."

SOURCE: Headquarters, B Battery (Searchlight), 29th Artillery

d. Illumination for the Starlight Scope.

"Item: Use of the searchlight in conjunction with use of Starlight Scope Device.

Discussion: The low level light amplification device (Starlight Scope) has been used successfully with diffused illumination from searchlights. During moonless nights, the starlight range of detection has been increased.

Observation: The range of the Starlight Scope can be materially increased by use of indirect searchlight illumination."

SOURCE: Headquarters, B Battery, 25th Artillery

e. Illumination Technique for Combat Patrols.

"Item: Use of the searchlight in support of combat patrols.

Discussion: A searchlight was employed to support a route security operation. The searchlight was placed on a small hill. At a distance of seven kilometers over rolling terrain, a combat patrol moved on a preplanned route known to the searchlight section chief. When illumination was required, the section would provide immediate indirect illumination over the patrol's location without further coordination.

Observation: That further use of this technique of employment be made."

SOURCE: Headquarters, B Battery, 29th Artillery

2. Army Aviation.

a. Post-Extraction Suppression.

"Item: Suppressing the pick-up site after the last extraction.

Discussion: After the last troops and equipment are lifted out of the pick-up area during the extraction operation, the armed helicopters providing overhead cover will expend their remaining ordnance in and around the extraction site. All avenues of approach are thoroughly covered in order to preclude immediate reoccupation by the Viet Cong.

Observation: This technique has proven very effective and on one occasion Tac Air was directed on Viet Cong observed exiting the area after the armed helicopters had completed the suppressive firing pass."

SOURCE: Headquarters, 145th Aviation Battalion

b. Offensive Fire.

"Item: Fire power capability of UH-1D and UH-1B helicopters.

Discussion: The offensive fire technique has been developed to strike known or suspected enemy locations, deny the enemy certain areas, and seal off possible escape routes. It is a technique which directs all available fire power of an airmobile task force into a specific location where enemy positions are known or suspected.

Observation: The short, rapid, devastating LZ preparation achieved maximum surprise and is recommended when the situation will permit."

SOURCE: Headquarters, 145th Aviation Battalion

c. Converging Flight Elements.

"Item: Converging of flight elements at the intermediate staging area.

Discussion: In the interest of saving time and fuel, it has been found that flight elements based at various locations are capable of flying directly to the intermediate staging area and linking up with the remainder of the airmobile force. By doing this, it has enabled early completion of the assigned mission.

Observation: This technique has proven very successful on several occasions and demonstrates that an airmobile task force can be rapidly assembled in flight."

SOURCE: Headquarters, 145th Aviation Battalion

d. Use of Helicopter Gun Ships.

"Item: Coordination between ground forces and armed helicopters.

Discussion: Positive identification of forward friendly elements and positions is difficult during operations in jungle or immediately after occupation of an LZ.

Observation: A greater degree of coordination between ground forces and gun ships must be established to insure positive identification of friendly elements. The fire from door gunners on armed helicopters must be very closely controlled when the aircraft is making a firing pass parallel to the front lines or when attacking targets on the periphery of landing zones."

SOURCE: Headquarters, 1st Infantry Division

e. Armed Helicopter Prestrike.

"Item: Utilisation of armed helicopters to conduct the LZ prestrike in place of Tac Air and artillery.

Discussion: In order to eliminate or vary the previously set pattern of lengthy LZ preparation, the technique should be varied in such a manner that a rapid, devastating prestrike be conducted within 30 seconds of the first flight element's arrival in the LZ.

Observation: As stated."

SOURCE: Headquarters, 145th Aviation Battalion

f. Employment of the O-1 Aircraft.

"Item: Low altitude required for effective O-1 visual reconnaissance program.

Discussion: Effective performance of the visual reconnaissance mission by O-1 aircraft against the type enemy represented by the Viet Cong requires low level operation. Before deployment in RVN of the 220th Aviation Company, there was little information available on visual reconnaissance under conditions prevalent in RVN. Experience in the past indicated that an altitude of 1500 feet was desirable altitude from which to observe. This supposedly kept the aircraft safe from ground fire and should have provided an optimum height for observation. This proved to be unfounded. The aircraft remained safe from ground fire but the VC also remained safe from detection. It was determined that 1500 feet is much too high to effectively detect the activities of an adversary as clever at camouflage and concealment as the VC. The working altitude was lowered until the routine operating altitude became 800-1000 feet. This has proven the optimum altitude for detection.

Observation: Aircraft of the 220th Aviation Company have taken numerous ground fire hits; however, losses have been surprisingly light. Aircraft of this unit have averaged one hit per 274 hours of operation. Only one carrier has been shot down. The O-1 aircraft can take a great deal of ground fire punishment and continue to fly."

SOURCE: Headquarters, 14th Aviation Battalion

g. Operational Requirement for Helicopter Door Gunner.

"Item: Use of door gunners.

Discussion: During the reported period various type missions were

flown without door gunners. By removing door gunners, additional space was made available for either cargo or additional passengers.

Observation: Door gunners are essential in the conduct of combat assaults into insecure landing zones or missions that consist of only one or two aircraft into an insecure area. However, on routine missions into secured areas or short administrative flights over secured routes, door gunners are not required. They should continue to be authorized on the basis of one per aircraft. The decision to utilize door gunners should be made on a mission basis."

SOURCE: Headquarters, 17th Aviation Group and Headquarters, 52d Aviation Battalion

h. Training in Night-Tactical Operations.

"Item: Night tactical training for aviators.

Discussion: Additional training in night tactical flying is required for all aviators. Routine administrative flights between point "A" and "B" do not present any unusual problems. The difficulties arise when low level surveillance flights are conducted at night over unpopulated areas. There are very few, and in some cases, no visual reference points other than an indistinct horizon. A pseudo-instrument flight is required with the pilot devoting approximately fifty percent of his attention outside the aircraft to assist the observer in locating VC activity. The most productive flights, in terms of detected activity, are those made when weather conditions are worst. Aviators must become proficient in making landings and take-offs from tactical airfields which are unlighted. The use of the landing light is not recommended since to do so will invite enemy fire. The alternate solution is to use aircraft flares or mortar flares fired on the command of the pilot. This method has been frequently used and is reliable and safe.

Observation: All aviators must be fully qualified in night tactical operations."

SOURCE: Headquarters, 6th Battalion, 27th Artillery

i. Directional Orientation for Aircraft.

"Item: Use of the searchlight as a direction orientation source.

Discussion: During OPERATION LINCOLN, aircraft frequently lost sight of recognizable terrain at night. The searchlight was utilized to provide directional orientation for aircraft and as a beacon for guiding aircraft into landing zones. Pilots could see the searchlight beam up to 15 kilometers from the source.

Observation: Searchlights may be effectively used to assist aircraft in direction finding."

SOURCE: Headquarters, B Battery (Searchlight), 20th Artillery

k. Flight Corridors.

"Item: Artillery flight corridor clearance.

Discussion: Prior to each battalion size airmobile combat assault, coordinates depicting the center line of the proposed flight corridor are relayed to higher headquarters for proper clearance. However, on numerous occasions these corridors were not properly cleared, thus, resulting in some operational delays and near misses.

Observation: Forwarding flight corridor clearance requests to AAE, II Field Force, Vietnam has reduced many of the previous problems encountered."

SOURCE: Headquarters, 145th Aviation Battalion

l. Multiple Landing Zones.

"Item: Combat assaults into multiple landing zones.

Discussion: When conducting combat assaults into multiple landing zones, coordination and control is very difficult. Also, the requirement for armed helicopter support is doubled or tripled in order to properly prepare the LZ(s).

Observation: By utilizing the armed helicopter platoons from the AML companies to help prepare the LZ's, simultaneous preparation may be accomplished. The armed helicopters do not escort the troop carriers all the way back to the staging area, but release them and pick them up at the R.P."

SOURCE: Headquarters, 145th Aviation Battalion

m. CH-47 Utilization.

"Item: Utilization of CH-47 helicopters in conjunction with UH-1D troop carriers on combat assaults and extractions.

Discussion: When conducting combat operations, it is not feasible to combine CH-47 helicopters and UH-1D troop carriers. Problem areas encountered are:

(1) Lack of proper communications.

(2) Maneuverability.

(3) Vulnerability.

(4) Complexity of operating system.

Observation: The CH-47 helicopter is ideally suited for resupply missions, artillery displacement and heavy cargo carry after the initial introduction of combat troops into the operational area. The repositioning of forces from one secure area to another by CH-47 is feasible and desirable."

SOURCE: Headquarters, 145th Aviation Battalion

n. Helicopter Techniques for Pinnacle Approaches.

"Item: Pinnacle approaches.

Discussion: Most aviators have a tendency to make their approaches to pinnacles too shallow. This type of approach has three distinct disadvantages; it forces the pilot to operate in the area of maximum turbulence for a longer period during the approach, it restricts visual surveillance of the landing area at the critical period just before touchdown by requiring a flare, and lastly, full effect of the low reconnaissance (short final) is lessened by reduced visibility and lower angle of sight allowing less reaction time with which to abort, should it be necessary.

Observation: That initial entry for a pinnacle approach should range from normal to a steep angle of approach commensurate with wind conditions. This gives the aviator maximum advantage and reduces the possibility of error to a minimum."

SOURCE: Headquarters, 52d Aviation Battalion

o. Operations in the Central Highlands.

"Item: Aircraft performance in the Central Highlands.

Discussion: This battalion has experienced several incidents during the reporting period. Most of these incidents could be properly described as "poor judgement" type accidents, however, inexperience and continuous stressful operating conditions were contributing factors. Density altitude and its effect on aircraft performance has been a principal contributing factor. On many days the density altitude exceeds 5000 feet. This reduces considerably the ability of helicopters to perform. This condition requires reduced loads and increased alertness on the part of the aviators concerned.

Observation: The use of the "go-no-go" card is the best method available under any given condition to determine reserve power available. All aviators must be knowledgeable and proficient in the use of this method, and must periodically be required to demonstrate proper use of this procedure."

SOURCE: Headquarters, 52d Aviation Battalion

p. Monitoring Aviator Flight Time.

"Item: Aviator Fatigue.

Discussion: This reporting period has seen a sharp increase of prolonged field operations, placing an increased load on the individual aviator. Units have been required to operate in the field continuously for several weeks. It is not uncommon for aviators to log 6 to 8 hours flying time.

Observation: That commanders at company, platoon and section level must continually monitor each aviator's flight time and be alert to detect signs of fatigue. The flight surgeon must also take an active interest in this area. Each aviator should be given periodic breaks to relieve the pressure and allow him to recuperate physically, when and if possible."

SOURCE: Headquarters, 52d Aviation Battalion

q. Safety.

"Item: Crew chief and door gunner safety.

Discussion: Crew chiefs and door gunners will occasionally loosen their belts to more comfortably adjust their firing position. On one occasion, the crew chief had loosened his seat belt on a landing approach. The aircraft had trouble during the final stages of the landing and crash landed rolling on its side. The crew chief was the only injury. He was thrown out of the aircraft and pinned beneath it.

Observation: That crew chiefs and door gunners must keep their seat belts snugly adjusted."

SOURCE: Headquarters, 52d Aviation Battalion

r. Observation of Dash "10" Procedure.

"Item: Decreased fuel consumption.

Discussion: Another procedure consistently practiced by this battalion, which can be of possible value to newly formed aviation units and as a teaching point for UH-1 helicopter transition training is strict observance of "DASH 10" procedures as they apply to reducing RPM for cruise flight to 6350.

Observation: That fuel consumption can be reduced as much as 100 pounds per hour by exercising rigid RPM control when maximum power is not required."

s. Helicopter Recovery.

"Item: Helicopter Crash Recovery operations.

Discussion: When an aircraft crashes in an area of operation, it is necessary to secure the area with a BIRDCAGE element and recovery team. These teams are normally not equipped to perform recovery of bodies, equipment, or weapons due to terrain, canopy, and jungle growth. BIRDCAGE elements are usually a platoon size force that is airlifted into crash sites as security for downed aircraft.

Observation: The BIRDCAGE operations SOP should include a list of equipment or provisions for supplying the teams with the necessary equipment to accomplish their mission. Equipment should include light block and tackle, axes, crowbars, and other necessary extraction equipment."

SOURCE: Headquarters, 173d Airborne Brigade

3. Artillery Support.

a. Modification of Fire Direction and Firing Battery Procedures.

"Item: Omni-directional artillery fires.

Discussion: It may be generally stated that, within this theater of operation, the conventional concept of the line of contact being forward of the artillery is no longer true. A circular line of contact, with the artillery located within the circular area, is the normal situation. Artillery units can effectively operate within this "6400 mil environment." Modifications to fire direction and firing battery procedures are required.

Oversize charts and chart tables must be constructed. For 8" and 175mm use, tables 58" square have proven satisfactory. The 8" howitzer is plotted on a scale of 1:25000. Due to the greater range of the 175mm gun, it is plotted on a scale of 1:50000. One chart can be used for both weapons; grid lines for the 8" are numbered in the normal manner in black. A second set of numbers in red is used for the 175mm gun with each grid square representing 2000 meters. Permanent indices are established at 800 mil intervals.

Chart operators must learn to plot using two different scales on the same chart. This has been accomplished without undue difficulty. Deflections determined by the chart operator are prefixed with the azimuth index used. The computer then applies corrections to this deflection before announcing it to the firing battery. For example, assume that one piece is layed on azimuth 700. A deflection to a target of 3034 is determined using the 800 mil index. The computer applies this 100 mil difference and announces a deflection of 2934 to the firing battery.

To prevent cluttering the chart with numerous adjusted deflection indices, the computer records the deflection corrections on the graphical firing tables (GFT's). This requires that four sets of GFT's each labeled for a different direction of fire, be maintained. The drift blocks are covered with transparent tape to prevent damage caused by the frequent changes in deflection corrections. The system also requires the computer to maintain an accurate record of the azimuth each piece is layed on. It is not unusual to have each weapon in a battery pointing in a different direction. This is done to decrease the time required to fire the initial and subsequent rounds during adjustment.

Observation: The procedure outlined above is complex, and requires close supervision by the Fire Direction Officer and chief computer. It is an effective and rapid means of determining firing data."

SOURCE: Headquarters, 6th Battalion, 27th Artillery

b. M123 Howitzer Firing Techniques.

"Item: The hydraulic propulsion unit of the M123 howitzer causes the left trail to act as a pivot point for the gun during the shock of firing.

Discussion: It has been found that regardless of the efforts made to secure the trails (spade logs, rails, sandbags, etc.), the sandy soil of Vietnam will not hold the spades during firing when using higher charges. With the additional weight of the hydraulic motor on the left trail, the howitzer pivots about the left spade, causing the howitzer to have a large right displacement. Therefore, when firing from static positions, the hydraulic units have been removed.

Observation: Removal of the hydraulic unit also saves damage to it from the shock of firing and enables deflections to the right to be rammed without traversing back to center of sector to avoid striking the hydraulic propulsion unit."

SOURCE: Headquarters, 1st Battalion, 30th Artillery

c. Increased Mobility for M123 Howitzer.

"Item: The cover of the hydraulic propulsion unit of the M123 howitzer is fragile. Its position on the trail precludes as small a turning radius as is possible with the M114 howitzer when towed by a five-ton truck.

Discussion: To shrink the turning radius of the truck and howitzer, the rear bumperettes were removed from the prime movers. This removed the point of contact when turning and enabled the vehicle to make sharper turns without damage to the howitzer propulsion unit.

Observation: Many of the narrow inadequate roads and particularly the approaches to bridges in Vietnam make sharp turns necessary. By decreasing the turning radius of the howitzer and prime mover, time can be saved on these roads and bridges that otherwise would be consumed in "jockeying" the vehicle back and forth."

SOURCE: Headquarters, 1st Battalion, 30th Artillery

d. Use of Vehicles on Airmobile Operations.

"Item: Artillery support of airmobile operations requires the shifting of trails as the rule rather than the exception.

Discussion: Because artillery often will be airlifted into the middle of a large VC infested area, the requirement for shifting trails exists as never before. But the airlift limitations often leave the battery short of personnel and equipment to accomplish this task. The 3/4-ton truck is, however, an adequate replacement for the heavier trucks in this situation. Light enough to be lifted, it is still rugged enough to move the six and one half ton M123. The truck method can eliminate ten minutes from the shifting by personnel alone method. The 3/4-ton truck is also invaluable in hauling water, fuel, and rations which may often be set down by helicopter several hundred meters from the battery location. A radio mount in the 3/4-ton truck will give it an additional capability—that of a command vehicle if desired.

Observation: A mechanical means of shifting trails greatly improves the speed and efficiency of a 155mm howitzer crew. For the time being, the 3/4-ton truck will represent a good solution to this and a variety of other problems."

SOURCE: Headquarters, 1st Battalion, 30th Artillery

e. Airmobile Cargo Loading.

"Item: On airmobile operations, the howitzer must arrive in complete loads and ready to shoot.

Discussion: The howitzer must be equipped with all section equipment necessary to fire when off-loaded from the CH-54.

Observation: Each section chief should be fully aware of the equipment he needs and must insure that his loading plan includes each of the critical items. A thorough check of the load to assure its secure attachment to the trails is also important."

SOURCE: Headquarters, 1/30 Artillery

f. Responsibility for Combat Support Coordination Center.

"Item: Combat Support Coordination Center.

Discussion: During OPERATION VAN BUREN this battalion assumed the overall responsibility of the entire Combat Support Coordination Center as it was originally established during OPERATION JEFFERSON. It was soon realized that the battalion lacked the staff and personnel to both control and administratively support a Combat Support Coordination Center, provide a Fire Support Coordination Element to the Center and provide the required command and control to its own batteries.

Operation: The requirement for a Combat Support Coordination Center should be established at a higher headquarters so that the battalion can exercise normal command and control responsibilities to its own organic batteries."

SOURCE: Headquarters, 5th Howitzer Battalion, 27th Artillery

g. Displacement of Medium Artillery by CH-54 Helicopter.

"Item: 155mm Howitzers can be moved by CH-54 Aircraft.

Discussion: A four-gun unit, A Battery, 1/30 Artillery, was repositioned on several occasions by four CH-54 sorties. The personnel and remaining equipment were moved by nine CH-54 sorties. 155mm Howitzers can be placed in strategic positions that best support the tactics of a particular operation. By using the CH-54, howitzers can be positioned in areas that are completely inaccessible by any means other than airlift.

Observation: This capability permits 155's to occupy firing positions to support tactical operations which otherwise would be inaccessible."

SOURCE: Headquarters, 1st Cavalry Division

h. Ammunition Transportation.

"Item: Difficulties in Ammunition Supply for Heavy Artillery Units.

Discussion: When moving cross-country in terrain suitable only for tracked vehicles, the battalion can transport only three (3) rounds per weapon and must rely upon aerial resupply.

Observation:

(1) An alternate means of ground ammunition transportation would be

to use the XM548 Full-Tracked Cargo Carrier. This would enable ammunition to be taken wherever the guns may go.

(2) Aerial resupply is feasible and was practiced on OPERATION LINCOLN. However, with a weight of approximately 260 pounds per complete round, the carrying capacity of cargo aircraft is very limited. A full load for a CH-47 is 24 complete rounds; for a CH-54 approximately 64 complete rounds and for a CV-2 approximately 28 complete rounds."

SOURCE: Headquarters, 6th Battalion, 14th Artillery

i. Cross-Country Mobility.

"Item: Breakdown rate of M107 and M110.

Discussion: On cross-country moves over other than established roads, the M107 and M110 have an excessively large number of mechanical failures.

Observation: Thorough prior ground reconnaissance is necessary to insure that the best possible route be selected. Movements of this nature should be executed only on an urgent mission basis."

SOURCE: Headquarters, 6th Battalion, 14th Artillery

j. Computation of Firing Data.

"Item: Fastest possible means of computing firing data.

Discussion: The average MET plus VE range correction for the 175mm gun is -1200M; for the 8" howitzer it is -600M. These average corrections can vary as much as ±500M depending on current weather conditions. Because of this large variation, a metro message must be solved for each mission in order to insure accurate fire when friendly personnel are within 2000M of the desired point of impact. Approximately ten (10) minutes are required to compute a metro message and apply it to chart data to derive firing data. Because of the amount of computations involved, there may be errors made by one of the computers which will require additional time to check out to insure accurate firing data.

Observation: The Gun Direction Computer, M18 which is authorized for this battalion on TOE 6-345D, with all associated equipment, will eliminate this time lapse and allow more accurate firing data to be

computed in seconds rather than minutes. Pending issue of the computer, maximum emphasis is placed on solution of metro messages and proper application of the corrections thus derived."

SOURCE: Headquarters, 6th Battalion, 14th Artillery

k. Training of Aerial Observers.

"Item: Observer training.

Discussion: The length of time required to train effective aerial observers is longer than had been anticipated. The most proficient student observer needs about forty hours of training while the slowest individual requires seventy. This can be primarily attributed to the following reasons:

(1) The difficulty in correlating features on the ground with a map. Approximately sixty percent of the area is jungle. There are relatively few key terrain features. Clearings indicated on maps usually are overgrown. Initially, observers are fortunate if they can determine the coordinates of a point within 2000 meters.

(2) The observer must become completely familiar with the terrain so that he is able to detect subtle day to day changes. This can only be accomplished by many flights conducted in all conditions of weather, both day and night.

(3) The greatest difficulty for the observer is to learn to visualize the gun-target line. Many targets fired upon are at ranges greater than 20 kilometers from the guns. At these ranges the observer cannot see the firing battery and is, therefore, required to "sense" the gun-target line.

Observation: The aerial observer program of instruction should be increased by 20 hours to 30 hours."

SOURCE: Headquarters, 6th Battalion, 27th Artillery

l. Starlight Scope in an Aerial Surveillance Role.

"Item: Starlight Scope in aerial surveillance.

Discussion: The Starlight Scope, a hand-held or weapon-mount instrument used to amplify available light, has proven to be an invaluable tool for the aerial observer. Its use has made it possible for targets to be acquired at night without alerting enemy forces. Flights are conducted at an altitude of 2000 feet above the terrain. The observer is able to search all clearings, roads, and rivers. Once a target is located, the observer must maintain visual contact while the pilot requests and adjusts artillery fire. This is a variation to the usual procedure where the observer does the adjusting. This variation is caused by the frequent inability of the observer to reacquire the target if visual contact is lost. This is, in turn, caused by the inadequate resolution present in the scope when used in an aircraft. It is not practical to use the Starlight Scope while flying below 1000 feet above the terrain. The relative motion is such that the observer becomes nauseated. An additional limitation is that the scope can only be used when the background light is augmented by the moon. Light from stars alone does not provide sufficient illumination. Even with the limitations mentioned, the Starlight Scope has been of significant value.

Observation: Starlight instruments should be issued to all units authorized observation aircraft."

m. Method of Positioning the Recoil Spade, M107/110.

"Item: Improper use of recoil spade on M107/110, self-propelled weapons.

Discussion: The purpose of the recoil spade located at the rear end of the M107 and M110 weapons carriage is to absorb the rearward recoil thrust. This is accomplished by lowering the lower half of the spade into firm ground if available. Frequently the artillery battery commander must lay the weapon on ground which will not support the spade under repeated firing of the 175mm gun and the 8-inch howitzer. This is especially true when maximum zone charges are fired. The result is that the spade digs into the ground until the entire spade is buried and the trailing idler wheel is positioned unsupported over the hole dug by the spade. The spade in this position absorbs an increased thrust since the greater portion of the vertical recoil is transmitted to the spade rather than the suspension system shock absorbers. These increased loads cause the tubular spade yokes to crack and the spade cylinders leak prematurely.

Observation: That artillery batteries construct earth and log or concrete and log ramparts that will support the spade at a depth of 8" to 12" below the ground level."

SOURCE: Headquarters, 185th Ordnance Battalion (M&S)

4. Engineer Support.

a. Construction of Airstrip at CAT.

"Item: Construction of a 2300-foot airstrip in a wooded area to accommodate C-123 traffic using organic engineer equipment.

Discussion: During OPERATION LINCOLN, Company A, 8th Engineer Battalion constructed a 2300-foot C-123 airstrip at a location where no roads existed into the site. All of the 51 tons of organic engineer equipment and materials required was moved by helicopter to the otherwise inaccessible area. Movement of all the heavy engineer equipment by helicopter was possible because of its sectionalized design. The ability to build such strips provides complete freedom in tactical maneuver planning since heavy logistic support can be delivered directly by the Air Force to precisely where it is needed.

Observation: Airstrips can be built in areas which are only accessible by helicopter, if sectionalized engineer equipment is available. Other engineer units operating in remote areas should consider the possibility of obtaining airmobile engineer equipment."

SOURCE: Headquarters, 1st Cavalry Division (AM), and Headquarters, 3d Brigade, 25th Infantry Division (observation only)

b. Armored Vehicle Launched Bridges.

"Item: Bridge requirements.

Discussion: The majority of bridging accomplished in support of counter-insurgency operations has been the dry-span variety, employing M-4 balk. Length of bridges has ranged from 15 to 40 feet. In many situations, an armored vehicle launched bridge (AVLB) would have been a more expedient method of bridging.

Observation: Units should include bridging requirements in all operations planning. Engineer units deploying to Vietnam should retain AVLB's."

SOURCE: Headquarters, 1st Infantry Division

c. Utilization of Engineer Support on Operations.

"Item: Employment of demolition teams.

Discussion: The most frequent and most effective utilization of engineer support on search and destroy operations has been attachment of demolition squads to maneuver battalions.

Observation: In view of the extensive fortifications encountered on S&D operations, there usually are not sufficient engineer demolition personnel to attach them to rifle platoons. It has been the rule in the past for these small demolition teams to accomplish all destruction. However, in heavily fortified areas, this is considerably time-consuming and slows down the advance of troops. Units must initiate actions to train personnel at the platoon level to allow engineer teams to perform destruction of major obstacles."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

d. Aircraft Parking Aprons.

"Item: Aircraft parking aprons.

Discussion: The use of PSP parking pads for CV-2, smaller fixed wing aircraft and helicopters, when significant earth-work (fill and stabilization) precedes the placement of pads, has proven to be wasteful of valuable equipment hours. The foregoing is true because of the complex drainage pattern established and the corresponding awkward employment of grading and compaction equipment.

Observation: Although more expensive in terms of PSP and man hours, the mass parking apron (generally placed at constant slope) is far more easily prepared for PSP, more durable, and of considerably greater value to the user for access, maintenance, and aircraft movement."

SOURCE: Headquarters, 20th Engineer Battalion (COT)

e. Construction.

"Item: Forming concrete pads.

Discussion: The use of wood forming for concrete pads involves several added steps in forming, e.g., new nails with each forming task, partial replacement of lumber after minimum reuse and inconsistent results (particularly where forming lumber is semi-hardwood subject to warpage in two dimensions).

Observation: Steel forms for concrete pads are more economical in time and materials, and produce a higher quality result."

SOURCE: Headquarters, 20th Engineer Battalion (CBT)

f. Security of Engineer Forces

"Item: Security of engineer construction forces.

Discussion: Engineer construction forces along the roads are vulnerable to sniper fire and ambushes. Work parties must be permitted to concentrate on the construction mission when they are employed along several miles of road.

Observation: Armored cavalry elements are ideally organized, equipped and trained to conduct road security missions for engineer construction forces. Foot patrols conducted from 100 to 500 meters on the flanks of the road preclude sniper and ambush sites from being occupied. Engineer personnel must be trained and organized as rapid reaction forces to complement assigned security forces."

SOURCE: Headquarters, 1st Infantry Division

g. Night Illumination.

"Item: Night crusher operation.

Discussion: Considerable difficulty has been encountered in night crusher operation due to a lack of 110 volt power required for lighting. As the 100 KW generator is wired to supply 416 V current to the crusher motors, 110 volts power is not available in sufficient amperage to run the lights. Therefore, a separate generator must be used for lighting.

Observation: The 75 TPH crushers should be rewired for 220 volt operation so 110 voltage could be obtained from the 100 KW generator or 220 volt bulbs should be placed in the system for flood lighting equipment set to operate on the present 100 KW generator arrangement."

SOURCE: Headquarters, 299th Engineer Battalion (COMBAT)

h. Dust Control.

"Item: Dust control.

Discussion: Many areas in Vietnam have serious dust problems during the dry season. Experimentation has shown the following procedures to be effective in the type of soil indicated.

(1) Laterite: Use 0.6 gal/sq yd of a 50-50 mixture of diesel and MCO (medium cure cutback) as a first penetration. Use 0.15 gal/sq yd as a second penetration.

(2) Silty sand: Dampen sand and roll to tighten surface using either a rubber-tired or steel-wheeled roller. Apply 0.5 gal/sq yd of a 50-50 mixture of MCO and diesel in two equal applications. In the event that materials or equipment are not available to accomplish these procedures, any improvised method should be used to check the dust. Spreading water or waste oil are possibilities that should not be overlooked.

Observation: Expert maximum effort to control dust. Morale, maintenance, and operational capability are adversely affected by this problem."

SOURCE: Headquarters, 159th Engineer Group (Construction)

i. Concrete.

"Item: Hot weather placing and curing.

Discussion: The extreme hot climate in the RVN poses several problems in the placing and curing of concrete. The hot sun beating down on foundations, gravel and sand, dries these items to a point where the normal amount of water in a batch of concrete is insufficient to prevent rapid evaporation which causes rapid curing and cracking.

Observation: To alleviate the problem before placing the concrete, the foundation, gravel and sand are thoroughly saturated with water, thereby cutting the absorption rate. The amount of water in the mix is adjusted accordingly. Also, after the concrete has begun to set, earth dikes are placed around the edge and the pad flooded with water, thereby retarding the curing."

SOURCE: Headquarters, 168th Engineer Battalion (Combat)

j. Loaning of Equipment.

"Item: Construction battalions are continually loaning equipment to combat battalions located in the same area.

Discussion: Combat engineer battalions in Vietnam are utilized primarily as construction engineer units. They do not have sufficient equipment to perform all required tasks and must borrow equipment from construction sites. Items most commonly borrowed include concrete mixers and compaction equipment of all types; in addition, wood working sets, generators and fuel tankers are sometimes borrowed.

Observation: Combat engineer battalions should be authorized additional equipment compatible with their assigned mission, and this equipment should be provided to the battalion prior to its entry in-country."

SOURCE: Headquarters, 46th Engineer Battalion (Construction)

k. Aggregate Stockpiles.

"Item: Segregation of aggregate in stockpiles.

Discussion: In large stockpiles of one-inch minus rock, poor gradation has occurred because of segregation of the stockpile. This has resulted in a waste of aggregate in asphalt production.

Observation: Separating the stockpile into two piles, then recombining them in the asphalt plant has greatly reduced segregation. The one-inch minus is now separated into piles of 1" to 3/8" and of 3/8" minus."

SOURCE: Headquarters, 35th Engineer Group (Construction)

l. Retention of Fines.

"Item: Loss of fines during rock crushing.

Discussion: It has been found that nearly all fines produced during crushing of blast rock are lost by being blown away by the slighest breeze. These fines, passing the #200 sieve, are an essential component of aggregate used for the production of asphalt.

Observation: A spray bar was installed over the main feeder conveyor belt coming from the primary crusher. The crushed rock coming from the primary was sprayed with water before passing to the secondary crusher. In this manner, nearly all fines were retained."

SOURCE: Headquarters, 35th Engineer Group (Construction)

m. Water Purification.

"Item: A lightweight, air-transportable water purification system is required.

Discussion: Combat operations to date have dictated the provision of water in areas that prohibited the introduction of organic water purification equipment because of its bulk and weight. Water had to be flown in fixed wing aircraft to forward airfields and subsequently lifted by rotary wing aircraft to troop locations. This proved a costly method of providing water both from the standpoint of man and equipment hours.

Observation: The provision of an air-transportable water purification system will alleviate this problem."

SOURCE: Headquarters, 3d Brigade, 25th Division

n. Power Generators.

"Item: Generator Set PU-619.

Discussion: Operational experience has shown that Power Unit 619 has had a high rate of failure. The breakdown has not been due to neglect of operator or organizational maintenance. Unit maintenance personnel have determined that the generator set has too high a RPM which, directly coupled with the extreme heat, dust, and humidity that the air-cooled engine must operate under, produces operating conditions greater than that for which the generator set was designed and tested.

Observation: Generator Set PU-619 should be reevaluated for operation in areas of extreme heat, humidity and dust, and as a source of power for extended operations."

SOURCE: Headquarters, 69th Signal Battalion

Section III

A SUMMARY OF LESSONS LEARNED
IN
"COMBAT SERVICE SUPPORT OPERATIONS"

1. Medical Service.

a. Hepatitis.

"Item: Infectious Hepatitis as Affected by Gamma Globulin.

Discussion:

(1) Incidence: Prior to the beginning of gamma globulin inoculations, there were 109 hepatitis patients out of 4140 admissions to this facility, a percentage factor of 2.6. Since the initiation of gamma globulin, there have been 189 hepatitis patients from 7591 admissions, a percentage factor of 2.5. Therefore, there being no significant variance in the percentage factor, it is indicative that hyperimmune globulin has little or no effect upon the incidence of infectious hepatitis in Vietnam.

(2) Severity: One-hundred and five (105) cases of infectious hepatitis were divided into 4 groups ranging from Group I (mildest cases) to Group IV (most severe). The severity was then related to the interval between the administration of gamma globulin and the onset of the disease. Increments of less than 1 month, 1-3 months, 3-6 months and greater than 6 months were used. This maneuver demonstrated that hyperimmune globulin apparently has no significant effect upon the severity of the disease.

Observation: As stated."

SOURCE: Headquarters, 9th Field Hospital

b. Malaria.

"Item: Malaria Treatment Experience.

Discussion:

(1) Oral Chloroquine: Of the 68 cases under study, 97% suffered relapse. The interval to relapse revealed a bimodal distribution with 1.6

days and 14.4 days respectively. This bimodal distribution would suggest that we are dealing with at least 2 separate strains of falciparum.

(2) Intramuscular Chloroquine: Of the 31 cases under study, 94% suffered relapse. Again, the interval to relapse revealed an almost identical, bimodal distribution with an average of 1.9 days and 16.0 days respectively. This suggests that chloroquine's failure to affect the course of falciparum malaria is not due to the failure of the gastro-intestinal tract to absorb the drug.

(3) Chloroquine and Quinine: Of 79 cases studied, 62.5% relapsed on an average of 14.2 days.

(4) Quinine: Of 34 cases studied, 76% relapsed on an average of 14 days.

(5) Chloroquine and Atabrine: Of 17 cases studied, 82.5% relapsed on an average of 12.4 days.

(6) Daraprine in Combination:

(a) Daraprine and Quinine: Of the 33 cases studied, 2.5% relapsed.

(b) Daraprine, Quinine and Sulfadiazine: Of the 43 cases studied, 2.5% relapsed. There seems to be no advantage from the addition of sulfadiazine to the Daraprine-quinine regimen.

(7) Kynex:

(a) Of 10 cases treated with Kynex, 2 relapses were noted.

(b) Of 4 cases treated with a combination of Kynex and Daraprine, there were no relapses noted.

(c) Of 3 cases treated with Kelfazine, there were no relapses noted.

(8) This pilot study of the above long-acting sulfa drugs suggest that they were an effective mode of therapy either alone or in combination with Daraprine.

Observation: As stated."

SOURCE: Headquarters, 9th Field Hospital

c. Falciparum Malaria.

"Item: Water Load Intolerance in Falciparum Malaria.

Discussion:

(1) Of 28 cases subjected to a standard water loading test, 40% were abnormal. Six (6) were corrected with 50 MG of cortisone acetate given 2 hours prior to the test. Four (4) were corrected with 2 oz of 80-proof alcohol given 30 minutes prior to the test. Two (2) were not corrected by either maneuver.

(2) This pilot study would indicate that either a partial adrenal insufficiency or inappropriate antidiuretic hormone secretion was to blame for the malaria patients' intolerance to a water load.

Observation: As stated."

SOURCE: Headquarters, 9th Field Hospital

d. Leptospirosis and Scrub Typhus.

"Item: Leptospirosis and Scrub Typhus Cases of Unusual Interest.

Discussion:

(1) A case of Scrub Typhus, proven by eschar and Weil-Felix, developed a pancytopenia during the 2d week of illness. Thrombocytopenia purpura was the most troublesome aspect of this case and appeared to respond to steroid therapy.

(2) A case of leptospirosis, proven by dark field examination of the urine, was admitted in an agitated state and later lapsed into coma. The case was also complicated by shock, congestive heart failure and salt losing nephritis. The shock responded to steroid and the congestive heart failure to digitalisation.

Observation: As stated."

SOURCE: Headquarters, 9th Field Hospital

e. Malaria.

"Item: Chemoprophylaxis (Malaria) Pills.

Discussion: It has been noted that certain personnel have experienced a nauseous effect after taking the prescribed weekly chemoprohylaxis pills.

Observation: The effects of the pill appear to be reduced if personnel take the pill late in the evening after eating a heavy meal."

SOURCE: US Army Strategic Communications Command (Vietnam)

f. Medical Clearing Station Location.

"Item: Positioning medical clearing stations.

Discussion: Locating medical clearing stations in close proximity to rotary/fixed wing landing strips has many advantages in affording quick medical aid to combat casualties. This has also posed problems in keeping these facilities clean of dirt, dust, and debris created by aircraft landing and taking off.

Observation: Landing areas for aeromedical evacuation aircraft should be marked to limit air traffic in the proximity of medical clearing stations. In addition, medical clearing stations should be positioned in areas away from heavy and/or routine air traffic."

SOURCE: Headquarters, 1st Infantry Division

g. Surgical Capability at Forward Clearing Company.

"Item: Surgical capability at forward clearing company.

Discussion: Frequently, zones of operations are quite distant from medical facilities which have a surgical capability. Life-saving minutes are often lost due to the time/distance factor for evacuation.

Observation: Where the time/distance factor for evacuation is excessive, augmentation of the forward medical clearing company, with a surgical capability, is extremely beneficial in providing resuscitative surgery."

SOURCE: Headquarters, 1st Infantry Division

h. Battalion Surgeons.

"Item: Employment of Battalion Surgeons.

Discussion: Battalion surgeons, when employed forward, are often unable to treat casualties occuring in the forward area because the majority of casualties are evacuated from the combat zone via air ambulance, directly to a medical clearing company, by-passing the battalion aid station.

Observation: Employment of battalion surgeons should remain flexible. If lines of communication are short, surgeons may deploy forward with their unit. If lines of communication are lengthy, battalion surgeons may augment the medical clearing company. Air ambulances usually operate from the medical clearing company; therefore, battalion surgeons may accompany ambulances to the pick-up site, administering resuscitative treatment on site and during the return flight to the clearing company."

SOURCE: Headquarters, 1st Infantry Division

i. Water Supply for Field Hospital.

"Item: The problem of an adequate potable water supply for a field hospital.

Discussion: Since the establishment of the 8th Field Hospital at Nha Trang, a never-ceasing problem has been sufficient potable water to meet the demands of all personnel and services. The present system consists of a diatomaceous erdilator, flocculation tank and reservoir mounted unit. Debris and sediment is steeled and clarified with ferric chlorite and limestone. Chlorination is effected with calcium hypochlorite (Ca_2HCL_3). The capacity of the reservoir was originally 5000 gallons and increased by an additional 5000-gallon tank. With full 24-hour operation augmented by 2 additional 5000-gallon water trailers, the hospital barely meets the daily minimum requirements (MDR) for efficient utilities operation. To accomplish this, latrines have to be shut down 2 hours daily. The demand for potable water in a tropical area is ever constant. The demands are even greater when the density of casualties, especially malaria and other fever cases, constitute up to or more than 50% of the occupied beds. Ice for wards and mess is often contingent upon potable water for ice making machines as local purchase cannot meet the demand and still supply the civilian population. A second system of non-potable water is not recommended for sewage disposal as the danger of contamination by cross connection is too great. Fire control without sufficient water is a constant threat.

Observation: A deep well system with adequate pumping, filtering and chlorination which would exceed normal requirements for a temperate zone

of operation should be given first priority in establishing and developing a hospital site in tropical areas. For a single potable system to serve all patients, personnel and service utilities, the MDR should not be less than twenty-five (25) gallons per person."

SOURCE: Headquarters, 8th Field Hospital

j. Surgical Hospitals.

"Item: Mobility of Surgical Hospitals (Mobile Army).

Discussion: In most cases, casualties are picked up from medical units in direct support of combat troops and evacuated by air to hospitals located at fixed locations. This is peculiar to this area where combat units operate from a "base camp." However, at times the operational area is too far, from a time-distance factor, to evacuate the casualty to a fixed hospital site.

Observation: Surgical Hospitals (Mobile Army) should remain mobile in order to relocate near the operational area to better support combat operations. The lesson learned here was that a Surgical Hospital should be kept mobile even though operating from a "base camp.""

SOURCE: Headquarters, 68th Medical Group

k. Medical Battalion X-Ray Capability.

"Item: X-Ray capability for the medical battalion.

Discussion: The TOE for a medical battalion organic to an infantry division does not provide for X-Ray units. Medical clearing companies are frequently operating in support of units quite distant from medical facilities with this capability. Many patients, both casualty and routine, who could normally be treated in the clearing company, must be evacuated due to a lack of X-Ray equipment.

Observation: It is recommended that X-Ray equipment be provided to medical companies when operating away from medical facilities in order to permit rapid diagnosis of wounds or injuries detectable only by use of X-Ray equipment."

SOURCE: Headquarters, 1st Infantry Division

1. Request for Medical Evacuation.

"Item: Requesting Evacuation.

Discussion: One of the most critical aspects of medical evacuation is the requesting and preparation for receipt of medevac.

Observation: In requesting medical evacuation helicopters, confusion is minimized if a standard procedure is used. It has been determined that the best system is for the request to go from the unit involved, through their battalion S3, to the Brigade S3, who in turn requests the aircraft. When other channels are utilized, confusion and/or duplicate requests often result. Unit commanders at the platoon level and squad level must be thoroughly familiar with Dustoff procedures, particularly with the information which must be transmitted with the request. Incomplete information as to number, type, and location of casualties and the tactical situation leads to unnecessary delay. Units must also be prepared to employ suppressive fire when medevac helicopters approach their landing zone. Sufficient smoke grenades must be available to mark the landing zones."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

2. Logistics.

a. General Observations.

Rough Terrain Materials Handling Equipment.

"Item: That underdeveloped logistical areas should be provided with adequate Rough Terrain Materials Handling Equipment.

Discussion: Most of the TO&E units dispatched to Cam Ranh Bay did not have adequate Rough Terrain MHE and some of those that were authorized it were not up to full strength. It is recommended that any units that may be sent to underdeveloped logistical areas be adequately equipped with Rough Terrain MHE rather than the relatively immobile commercial type. Ordnance Ammunition companies are notably well equipped to perform their missions. Even these units, however, should have at least one crawler crane as a substitute for one of their 4 truck-mounted cranes. Most other logistical units have inadequate TO&E's to function in underdeveloped areas.

Observation: That all TO&E units that may be required to operate in underdeveloped areas be equipped with Rough Terrain MHE, not commercial type."

SOURCE: Headquarters, US Army Depot, Cam Ranh Bay

Advance Shipping Data.

"Item: Large quantities of material associated with project codes have been received by the Supply Division.

Discussion: This depot seldom has advance warning of these shipments and often does not know the intent of these project codes. Redistribution or inventory management actions are usually required by this depot. When advance information is provided, the Supply Division can assure the probability of success by planning and executing appropriate action.

Observation: Establish a single point in CONUS to distribute information related to automatic shipment OPLANS and automatic stockage of provisions for organizations deploying to this theater. In addition, information pertaining to the intent of the project code, criteria for selecting range and quantity of material and total due in on each FSN, number of days supply in each package, CONUS Terminal Arrival Date and/or Overseas Terminal Arrival Date for shipment and the theater location of unit assigned POM project codes is the minimum required information necessary for this depot to accomplish its objective."

SOURCE: Headquarters, 543d Quartermaster Group

Non-Perishable Subsistence.

"Item: That non-perishable subsistence should not be shipped to a build-up area in commercial containers.

Discussion: Most of the non-perishable subsistence shipped to Vietnam in the early stages of the buildup was packed in commercial cardboard cartons. Nearly all this food had to be stored in the open with no covering, not even a trapaulin. The cartons soon disintegrated and the cans rusted causing waste of food and excessive handling problems.

Observation: All non-perishable subsistence destined for a theater of operations where there are no developed logistical installations should be packaged in military V board containers or, as a minimum, be palletized, overwrapped and banded."

SOURCE: Headquarters, US Army Depot, Cam Ranh Bay

Aircraft Support Packages.

"Item: New model or type aircraft introduced in-country.

Discussion: Support packages are not being received by direct support units for newly introduced aircraft. Repair parts and special tools will remain in short supply until support packages and replenishment stocks catch up with the buildup of operational units.

Observation: When a new model aircraft is introduced into the theater, a support package should be sent to the direct support units before the aircraft arrives. If the aircraft arrives first, it should be held in depot stock until repair parts stockage is adequate."

SOURCE: Headquarters, 765th Transportation Battalion (AM&S)

Power Supply.

"Item: Issue of Diesel Generators.

Discussion: Signal units shipped to Vietnam brought with them the gasoline generators authorized by TO&E as components to signal equipment. These generators, although sufficient for CPX's and FTX's of short duration, are not sufficient for operation for long periods of time. They do not deliver sufficient power to supply administrative power requirements and are not reliable for long periods of time. It soon became necessary to obtain heavier diesel type generators which deliver more power and are more reliable.

Observation: The TO&E's as presently constituted are not adequate to power equipment in an area where there is no reliable commercial power. Upon receipt of information that a unit is to be deployed to a remote area, an immediate increase in generator authorizations should be obtained."

SOURCE: Headquarters, 2d Signal Group; Headquarters, 1st Battalion, 30th Artillery; and Headquarters, 394th Transportation Battalion (Terminal)

Logistical Coordination.

"Item: Requisitioning of equipment power supply and complete end items.

Discussion: Fifteen-ton ice plants which require large quantities of water and electrical power were requisitioned with no provisions for electrical power. Walk-in refrigeration units were requisitioned without the refrigeration system, i.e., compressor, evaporator, and motor. These units could not be used until the refrigeration systems were received.

Observation: Coordination must be made with the engineers whenever ordering equipment which requires an external power source such as ice plants. When requisitioning, determine that the Federal Stock Number of the item requisitioned is the complete end item and not just a component."

SOURCE: Headquarters, 1st Logistical Command and Headquarters, 937th Engineer Group (Combat)

Tactical Operations.

"Item: Ammunition support for tactical operations.

Discussion: For timely and adequate support of tactical operations, prior weapons density data is needed to determine required "day-of-supply" for ammunition and to initiate action to insure adequate stocks are available.

Observation: Weapon density information should be provided by tactical commanders at least 10 days prior to start of operations."

SOURCE: Headquarters, 3d Ordnance Battalion (Ammunition)

Ammunition Packing.

"Item: Ammunition packing containers and materials.

Discussion: Using units are not returning packing containers and materials generated by expended rounds. Packing containers and materials are required in the conduct of normal maintenance operations by ammunition units.

Observation: All ammunition packing materials should be returned to an Ammunition Supply Point by the using units."

SOURCE: Headquarters, 184th Ordnance Battalion (Ammunition)(DS)

Air Armament.

"Item: Air Armament Sub-systems.

Discussion: The difficulty in transportation and communications in handling sub-system kits in theater and the magnitude of getting the aircraft, the people, and the kits together at one time requires that the complete sub-system be packaged together.

Observation: Components of armament sub-system must be packaged together."

SOURCE: Headquarters, 34th General Support Group (AM&S)

Sundry Packs.

"Item: That sundry packs (Health and Comfort Items) should not be shipped by line item to an underdeveloped build-up area.

Discussion: Nearly all the cigarettes, candy, cigars, combs, razors, etc., to be issued to the combat troops who have no post exchange arrived in Vietnam in large shipments by line item. This made it necessary for the logistical troops in the theater to break the items down into regular Sundry Packs (a certain number of each item for so many men for so many days). This is time and labor consuming and requires covered space that is probably not available.

Observation: The Sundry Packs should be assembled in CONUS or in some other area where personnel, equipment and covered space is readily available and shipped to the Theatre of Operations properly packaged."

SOURCE: Headquarters, 34th General Support Group (AM&S)

POM Requisitions.

"Item: Requisition of Replacement Equipment.

Discussion: Some units have deployed from the United States with amber equipment which has caused maintenance problems. Extra time and effort has been exerted in obtaining repair parts and maintaining and preventing the equipment in becoming deadlined.

Observation: If units departing CONUS with amber equipment could be allowed to place POM requisitions for items which will need replacement in the near future, the maintenance problems would be lessened. Equipment on POM requisition would become available in the overseas command about the time the older equipment would need to be replaced."

SOURCE: Headquarters, 98th Quartermaster Battalion (GS)

Maintenance Equipment.

"Item: Equipment augmentation.

Discussion: To enable the command to furnish complete maintenance capability, a fuel control test stand was ordered and received during the period. This fuel control testing capability allows the general support maintenance unit to test and repair fuel controls installed on the T-53 and T-55 Turbine Engine manufactured by Lycoming Corporation. These items are classed as Hi-Dollar value items, and only the most sophisticated test equipment can service them.

Observation: (a) During two months of operation, 98% of all fuel control units have been returned to service. (b) Continued use of this equipment will result in large savings of money and turn around time since a very few units will have to be returned to CONUS for repair."

SOURCE: Headquarters, 34th General Support Group (AM&S)

Storage of Sandbags.

"Item: Damaged sandbags.

Discussion: Burlap sandbags with oil based preservative were stored improperly. The result was loss of sandbags by spontaneous combustion.

Observation: Store sandbags with adequate ventilation and practice proper fire protection."

SOURCE: Headquarters, 1st Logistical Command

b. Construction.

Sodding Barren Areas.

"Item: Sod aids in dust control and improves drainage characteristics.

Discussion: In most of the inhabited areas of Vietnam, particularly troop billet areas, the grass and topsoil have been removed by grading and traffic creating a problem with both dust and mud. Although seeding has failed to produce desirable results, the use of sod has proven quite effective. The sod can be cut in the outlying areas, transported to the placement sites and placed using local Vietnamese laborers, unless security precautions dictate otherwise. The sod thrives unusually well even without watering and is particularly effective during the rainy seasons. The sod should be rolled or tamped after placement but thrives even without this effort. A cover of good sod practically eliminates the dust problem, significantly improves the drainage characteristics of the soil, e.g., reduces the coefficient of runoff and stabilizes the soil to prevent mud, and generally enhances the appearance of the area.

Observation: Sod should be used by all units to improve billet areas and to reduce dust and mud in other barren areas."

SOURCE: Headquarters, 70th Engineer Battalion (Combat)

Rock Drills.

"Item: Bit, Star, Rock Drill.

Discussion: Steel bits have been used in drilling granite, due to the critical shortage of bits with tungsten carbide inserts, with very poor results. The steel bits wear out after about 2 feet of drilling where the tungsten carbide bit lasts approximately 18 feet.

Observation: Steel bits are a waste of effort from both the logistical and operational standpoint when working in granite.

SOURCE: Headquarters, 299th Engineer Battalion (Combat)

Construction Planning.

"Item: Self-Help Construction.

Discussion: Upon arrival in-country, units moving into permanent or semi-permanent field locations are required to construct floors and tent frames on a self-help basis. Since most units do not have qualified carpenters or tools, considerable time, effort and material is unnecessarily expended to provide satisfactory operational and billet areas. Assistance to incoming units should include:

(1) Plans and drawings of self-help projects be provided to unit.

(2) Bill of material be provided unit.

(3) Technical engineer assistance be given to unit during initial construction phase.

(4) That suitable lumber (new or usable dunnage) and nails be stocked and made readily available for incoming units.

(5) That power tools be brought with the unit or made available upon arrival in-country.

Observation: Prior to departure from CONUS, units should develop plans for semi-permanent locations upon arrival in-country. They should also augment their TAT RED equipment with certain hard to get items such as light fixtures, electric outlets, and plumbing fixtures as well as other items with which they can improvise and improve their living conditions."

SOURCE: Headquarters, 68th Medical Group

Closed Sumps.

"Item: Fine-grained soils won't support a closed-sump septic system.

Discussion: The fine-grained soils in the area around An Khe are not sufficiently porous in their native state to permit drainage by soil seepage. Consequently, closed sumps have failed almost without exception. The only method found satisfactory was an open-end drain, preferably of the French-type. The drain should begin at the mess hall or other facility and terminate some distance away in an open drainage channel. The drain should be filled with 4" to 6" rock and covered with some material that will prevent the drain from becoming clogged from the top by the fine-grained soil. A series of such drains can be used to drain a unit area or even one central drain with laterals if the topography permits. The drain is easily constructed and filters quite effectively. A grease trap can be built to empty directly into the drain.

Observation: Consider the soil gradation before selecting a septic system. If the soil will not drain properly, use the type drain described."

SOURCE: Headquarters, 70th Engineer Battalion (Combat)

Expedient Concrete Mixer.

Discussion: Concrete mixers are at a premium in Vietnam. One unit badly in need of a mixer devised this scheme. A 55-gallon drum was placed in a pivoting frame on a pole trailer. The front tire was removed from a jeep wheel and steel lugs were welded to the wheel. A continuous chain was placed over the jeep wheel and over a drive wheel on the base of the drum. The jeep was jacked up and placed in front-wheel drive to power the makeshift mixer. Production was much higher than with hand-mixing, and more uniform concrete was obtained.

Observation: Increased production justified the temporary loss of the vehicle."

SOURCE: Headquarters, 159th Engineer Group (Center)

Roofing.

"Item: Application of Corrugated Asbestos Roofing.

Discussion: Corrugated asbestos roofing is being used on many projects in Vietnam. The following information based on extensive experience is provided to facilitate installation:

(1) Asbestos is easily broken; it must be handled carefully.

(2) The minimum end overlap is 6'.

(3) The side lap should not be more than one-half corrugation. If more side lap is used, expansion is restricted so that the asbestos may split.

(4) The J-bolts used must not be placed on the side lap. If the bolts are used on the side lap, splitting will probably occur.

(5) Rafter longitudinal bracing should be used. Failure to do so will allow the roof to shift and subsequently crack the asbestos.

(6) A string must be used to align the roofing properly.

Observation: Care is required in placing asbestos roofing in order to avoid needless waste."

SOURCE: Headquarters, 159th Engineer Group (Construction)

Hasty Helipad Construction.

"Item: Improvement of tactical helipads.

Discussion: Elements of the group have operated from forward areas in support of combat operations where helipads and maintenance areas have consisted of bare stretches of sandy soil. In a study conducted by the 10th Battalion, the following has been determined:

(1) Replacement of five turbine engines at an average of 486 hours.

(2) Replacement of 10 rotor blades at an average of 360 hours. Normal life expectancy is 1000 hours.

(3) Replacement of 5 main rotor hubs at an average of 434 hours. Normal life expectancy is 1100 hours.

(4) Replacement of numerous main rotor pitch change links at an average of 2000 hours. Normal life expectancy is indefinite.

The 10th Aviation Battalion is presently testing T-17 membrane at Tuy Hoa, RVN. This membrane is considered an interim measure. This material is heavy and requires engineer support to emplace.

Observation: A need exists for a lightweight, durable material for hasty construction of dust and sand free heliports. Ideally, the material would be transportable by using unit and easily installed."

SOURCE: Headquarters, 17th Aviation Group and Headquarters, 13th Aviation Group

Pipe Bending Machine.

"Item: Expedient Pipe Bending Machine.

Discussion: Accurate bending of pipe and tubing is required in laying pipelines. An expedient pipe bending machine was designed by the 159th Engineer Group and constructed by the 46th Engineer Battalion. The device consists of a 21-foot long 18-inch web I beam with a shaped vise jaw mounted near one end and a ladder-like alignment device near the other end. The shaped vise jaw is welded to a section of the I beam which in turn is welded to the top of the main beam. In practice, the bending thrust is provided by a standard hydraulic jack from a 2½-ton or 5-ton truck. A section of API pipe provides a shaped pressure plate and is mounted on a flexible socket. A movable pointer acts as a deflection gauge. A separate pipe stand supports the pipe as it is fed into the bending machine. Plans for this machine are available at this headquarters.

Observation: Accurate bends can be obtained saving pipe and manpower."

SOURCE: Headquarters, 159th Engineer Group (Construction)

Consolidate Generator Shelter.

"Item: Generator Noise.

Discussion: Generator noise not only gives away the battery position but also helps to mask sound of personnel attempting to infiltrate the position. Noise was greatly reduced at the perimeter by consolidating generators in a revetted position near the battery center. Power cable extensions were required for several pieces of equipment. The generators were further muffled by extensive sandbagging.

Observation: The requirement for tactical power was fulfilled as well as minimizing distracting noise on the perimeter."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

c. Maintenance.

Ammunition.

"Item: Maintenance of ammunition in hands of supported units.

Discussion: In high humidity and temperature, ammunition and ammunition packings deteriorate rapidly. In accordance with FM 9-6, liaison teams have been established to provide recommendations to using units. Letters sent to units have produced little response.

Observation: Command action is needed to require periodic inspection by using units of ammunition on hand."

SOURCE: Headquarters, 3d Ordnance Battalion (Ammunition)

Vehicle Maintenance.

"Item: Fifth Wheel on M52A2, 5-ton Tractor.

Discussion: The constant presence of dirt and sand in road travel in Vietnam has caused, in some cases, more than normal wear on the fifth wheel.

Observation: Constant attention of the drivers to the fifth wheel condition and proper maintenance, to include scraping the wheel clean and putting clean grease on the fifth wheel has reduced many of the problems in this area."

SOURCE: Headquarters, 11th Transportation Battalion (Terminal)

Protective Mask.

"Item: Protective masks must be kept dry.

Discussion: During recent operations in which the friendly use of RCA was imminent, personnel approaching the objective crossed a deep river. Their protective masks were not in the waterproof bags and as a result were rendered useless when exploiting the RCA employment. This also required that the filters be taken out and dried or replaced.

Observation: Protective masks should be kept in waterproof bags until they are needed. If they are removed from these bags prior to the attack, they must be kept out of the water to be of any value."

SOURCE: Headquarters, I Field Force Vietnam

HPIR Overheating.

"Item: High Power Illuminator Radar (HPIR), AN/MPQ-39.

Discussion: During late March and early April, it was noted that the pressure of the gaseous freon within the high voltage power supply (HVPS) was increasing as the average daily temperature became higher. This was but one indication that a general overheating condition existed within the radar. Several repeated malfunctions were felt to be directly attributable to this condition. As an immediate method of alleviating this problem, all batteries were instructed to leave the radar transmitter door panel number one, two and three open except during periods of inclement weather. As an additional precaution against the unnecessary porting of freon from the safety valve due to the over pressure conditions, the batteries were instructed to leave the freon pre-heat circuit breaker in the "Off" position at all times. Immediate results were noted in the form of less equipment malfunctions and an average decrease of 15 psi in all high voltage power supplies.

Observation: An overheating problem has previously been noted in both Panama and Florida although it was not established that this was the direct cause of equipment malfunctions. It was known, however, to be a cause of equipment deterioration at a rate exceeding design expectations. It appears, based on our experience, that the local temperature average exceeds those of other areas and is sufficient to be the direct cause of equipment malfunctions. The entire matter has been documented and referred to the US Army Missile Command for resolution. Oven thermometers have been requested, both through supply channels and from the US Army Missile Command; the receipt of these will allow a more complete evaluation of this problem."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

Reduction of High Temperature/Electronic Equipment.

"Item: Battery Control Center, Signal Repair and HAWK Field Maintenance Equipment Vans.

Discussion: High temperature conditions have been a source of problems in almost all items of electronic equipment. One of the most notable problem areas has been the air-conditioned vans. These vans, olive drab in color, contain a large amount of heat generating electronic equipment;

this fact, coupled with the heat absorbing qualities of the dark outer surface, rendered it almost impossible for the air-conditioners to maintain an acceptable temperature level within the vans. Many equipment failures were attributed to this problem and an extraordinary number of marginal performance figures resulting from the unstable condition of the overheated equipment. An interim method of increasing the efficiency of the air-conditioners was found in the form of a locally-constructed cover or shield positioned 12-18 inches above the top of the vans and providing a shield against the direct rays of the sun. An additional method of combating this problem appears likely by the use of solar reflective paint. Two types of this paint have been requested through both supply channels and directly from the US Army Missile Command. One type currently in use for Signal Corps vans is transparent to solar radiation so that a white undercoat may reflect the heat without negating the camouflage qualities of the outer coat. The most promising type is not available at this time but is programed for issue in the near future. This paint is OD and is rated as capable of reflecting 125 degrees of solar radiation compared to a reflective rating of 35 degrees for the paint now in use. The entire matter of overheating equipment has been documented and referred to the US Army Missile Command for investigation and final resolution.

Observation: There is no doubt that the extremely high temperatures experienced in this area have acted in a detrimental manner on electronic equipment. The degree of degradation is still in doubt and the final method of correction has not yet been determined; however, the actions taken by this battalion have served to reduce other symptoms of overheating which have been observed."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

Preventive Maintenance.

"Item: Generator 45KW, 400 cyc, Stewart-Stevenson.

Discussion: The generator is a primary source of tactical power for both the HAWK system and Hercules air defense system; however, when used with the HAWK system, it was found to be extremely vulnerable to driving rain which shorted out the generator at the back of the Hercules outlets."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

HAWK System Maintenance.

"Item: Diesel Fuel for Generator Set, 45KW, 400 cyc, Stewart-Stevenson.

Discussion: A great many problems and equipment malfunctions were traced back to unacceptable and unexplained frequency fluctuations in the output of the precision power generators which are the primary power source for the HAWK system. All corrective actions cited in appropriate technical manuals were taken without anything more than a temporary correction of the problem. The appearance of the diesel fuel issued to the battalion led to a suspicion that it did not contain sufficient lubricating properties for the proper operation of the fuel injector assemblies. OE-30 lubricating oil was added to the fuel in ratios of from 1 to 10 parts to 1 to 20 parts. After many experiments, it was determined that the ratio of 1 to 20 while requiring longer to correct the malfunction would provide up to 200 operating hours without fluctuation. This problem, as well as the recommended corrective measure, has been documented on an equipment improvement report to the US Mobility Command.

Observation: It would appear that some agency within the procurement channel has failed to assure that all specifications for diesel fuel, as set forth in TM 10-1105, have been met. An attempt to have a sample of the fuel analysed in-country was not successful so that no final determination may be made by this battalion. This is the second incident in which poor quality or contaminated diesel fuel has caused equipment malfunction. The first was occasioned when diesel fuel contaminated by water was issued in bulk quantity to this battalion."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

Driver Maintenance and Training.

"Item: Clutch Malfunctions.

Discussion: During the first three months on station, clutch malfunction accounted for much of the deadline rate. Operators unfamiliar with operating in sand were a contributing factor. Failure to lubricate pedal cross shaft (3/4-ton truck primarily) causes the clutch to slip or gears to fail to engage properly. Attempting to down shift and riding clutch when descending high hills was still another factor.

Observation: Driver training and proper lubrication of the clutch assembly has been emphasized. When traveling in soft sand, drivers are

required to use low gear. When descending steep hills, they are required to use the low range gear."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

PM for Electronic Components.

"Item: Storage of Electronic Components.

Discussion: Electronic chassis and components are subject to rapid deterioration in the climatic conditions that prevail in Vietnam. Sealing these components in plastic bags, which are readily available through re-use or on the commercial market, will provide protection against the dust and moisture which are so common.

Observation: All plastic bags should be retained and utilized. Personnel should be advised of the savings which could result from such procedures."

SOURCE: Headquarters, 97th Artillery Group

Electronic Test Equipment.

"Item: Corrosion of Test Equipment.

Discussion: Certain pieces of electronic test equipment suffer from wetting and high humidity conditions.

Observation: Electronic test equipment having built-in heaters should have these heaters operating at all times when the equipment is not in use. Each item of equipment should be operated an hour each day for the purpose of drying out the equipment."

SOURCE: Headquarters, 1st Logistical Command

Signal Repair.

"Item: Non-available Signal Repair Parts AN/TRC-24.

Discussion: Relay K101, FSN 5945-642-0449, Receiver R-417 AN/TRC-24, has been on requisition for several months. This organization had two (2) R-417 Receivers deadlined caused by the non-availability of this relay. A close inspection of Relay K-101, FSN 5945-259-1231, Transmitter T-302 AN/TRC-24, revealed that this relay has the same characteristics as the Receiver relay though it is different in size. The non-available Receiver relay has been replaced with the available Transmitter relay in the deadlined equipment. A total of four (4) receivers have been restored to operation in this manner and all function properly.

Observation: This is not an authorized replacement part, however, the equipment has been restored to use. Possibly other repair part problems could be solved in this manner, but a careful analysis must be made to determine if the part will detract from the efficiency of operations."

SOURCE: Headquarters, 97th Artillery Group

Maintenance of AN/MTC-1 Switchboard.

"Item: Maintenance of AN/MTC-1 switchboard in a dusty environment is difficult.

Discussion: The extremely dusty conditions in sandy and windy areas of II Corps Tactical Zone cause relays in the switchboard to become erratic or inoperative over extended periods of time.

Observation: Relays should be cleaned by means of a vacuum cleaner or air hose on a weekly basis or more often if possible."

SOURCE: Headquarters, 5th Signal Battalion

CG-692 Connector.

"Item: CG-692 "cobra head" connector failures in AN/GRC-26.

Discussion: Repeated use of the CG-692 connector will result in a tendency for it to allow moisture to short RF signals.

Observation: These connectors should be taped completely with a water-proof rubber tape prior to their use."

SOURCE: Headquarters, 5th Signal Battalion

Maintenance of Deadlined Equipment.

"Item: Accumulation of moisture in deadlined HAWK equipment.

Discussion: In several instances, HAWK equipment has been deadlined awaiting parts for extended periods of time. On these occasions the equipment was closed and sealed from the elements to the greatest possible degree; however, it was found that upon receipt and installation of the repair parts in the deadlined equipment that moisture and/or condensation had accumulated inside equipment housings. This moisture created additional problems when equipment check-out was attempted.

Observation: Consideration should be given to the feasibility of keeping deadlined equipment in the highest state of energization, consistent with equipment safety, in order to maintain internal heating and drying."

SOURCE: Headquarters, 6th Battalion, 56th Artillery

Controlled HPIR Repair Facility.

"Item: Controlled environment repair facility for High Power Illuminator Radar high voltage power supplies and hydraulic actuators.

Discussion: Upon arrival in this theater, it was learned that an urgent need existed for a controlled environment (temperature and humidity) repair facility for the effective repair of the high voltage power supplies for the High Power Illuminator Radars and for repair of the hydraulic actuators for the 400 cycle and the 60 cycle, 45 KW generator. Experience of this organization has shown that high voltage power supplies repaired under uncontrolled conditions fail before 100 hours of operation. The design life after proper servicing of this component should be around 1000 hours.

Within a twenty-five week period, this organization experienced a usage of seventy-four hydraulic actuators. Requisition of this component from CONUS has taken from two to four weeks. If, at that time, a controlled environment repair facility had been available, fifty percent of these actuators could have been made available by repair by this organization. As of the date of this report, the required repair facility has been requisitioned by this organization.

Observation: The minimum requirements for a humidity-free repair facility are:

(1) A minimum of 400 square feet working area.

(2) A floor that can withstand a pressure of 400 pounds per square foot.

(3) Twice the amount of air-conditioner BTU's required under normal conditions to maintain a seventy-two degree fahrenheit temperature for the size of facility constructed (extreme heat is generated during the repair of this component which necessitates the additional cooling capability)."

SOURCE: Headquarters, 6th Battalion, 71st Artillery; Headquarters, 6th Battalion, 56th Artillery; and Headquarters, 79th Ordnance Battalion (M&S)

Aircraft Preventive Maintenance.

"Item: Reduced Bearing Life.

Discussion: Due to extremes in weather, flying, and parking conditions, aircraft wheel bearings and bearing surfaces on helicopters have shown a need for continual maintenance.

Observation:

(1) Clean and repack aircraft bearings (tail and main gear wheel bearings) every 25 flying hours instead of the required 200 hour period.

(2) Bearing and bearing surfaces on helicopters should be checked more often than required to insure that proper tolerances are maintained."

SOURCE: Headquarters, 2d Signal Group

Maintenance and Repair of Rock Crusher.

"Item: Crusher Air Filters.

Discussion: In the dusty conditions at An Khe, the standard dry air filter on the rock crusher was a constant source of concern and maintenance. Of many possible solutions considered for the air filter problem, the best appeared to be an oil bath filter. The filter from a

Super C Turna Dozer can easily be adapted to the crusher and is completely satisfactory.

Observation: Covers should be installed when crushers are operated near quarry face."

SOURCE: Headquarters, 299th Engineer Battalion (Combat)

Protective Covers.

"Item: Crusher Motor Protective Covers.

Discussion: Effective covers can be made from ½ of a 55-gallon drum or from a section of half culvert. Space must be left between the shield and motor for air circulation.

Observation: Covers should be installed when crushers are operated near quarry face."

SOURCE: Headquarters, 299th Engineer Battalion (Combat)

Combined Maintenance Facilities.

"Item: Unit Maintenance Facilities.

Discussion: Unit Maintenance facilities are becoming overburdened due to lack of personnel, area, and equipment to handle the items requested in excess of authorized allowance. There is presently a plan to combine unit maintenance facilities in one central location under direct control of the battalion maintenance officer. All MHE, power equipment, wheeled vehicles, etc., will be separated into sub-sections utilizing available maintenance personnel in each location. This plan is expected to result in an improved maintenance program. In addition, maintenance buildings have been requested and approved for construction in the near future.

Observation: Units and organizations should continually review maintenance procedures and facilities, and take appropriate measures for improvement."

SOURCE: Headquarters, 394th Transportation Battalion (Terminal)

Periodic Inspection.

"Item: Use of Dry Batteries in Signal Equipment.

Discussion: Dead dry batteries can ruin and/or severly damage battery-operated equipment. The hot, humid climate in Vietnam causes a leakage of highly corrosive chemicals into battery compartments which can, thus, cause an item to become non-repairable.

Observation: A systematic and periodic inspection of all battery-operated equipment must be made as required by the basic TM and all batteries must be removed from equipment when not in use."

SOURCE: Headquarters, 79th Ordnance Battalion (M&S)

Scheduling of Organisational Maintenance.

"Item: Sustained Equipment Commitment Density Precludes Normal Scheduled Servicing of Vehicles.

Discussion: Due to the intensive daily requirement for vehicles, it proved unsatisfactory to adequately perform scheduled maintenance of vehicles when due. Drivers were not available to accompany their vehicles into Service Maintenance.

Observation: Steps were taken to perform scheduled maintenance at night when maximum number of vehicles are available and only emergency or major repairs on deadlined vehicles in the daytime. Platoon teams were set up to inspect and correct all first echelon deficiencies found on vehicles at night."

SOURCE: Headquarters, 11th Transportation Battalion (Terminal)

Periodic Maintenance of 45 KW Generator.

"Item: Contaminated hydraulic fluid can cause failure of hydraulic actuators.

Discussion: This organisation has experienced a high failure rate of hydraulic actuators on 45 KW, 400 cycle, Stewart-Stevenson, Model 52300 generators. Failures appear to have been caused by contamination and accumulation of foreign matter in the hydraulic fluid tank.

Observation: It is felt that failures can be reduced to an acceptable rate by the following organizational maintenance procedures which have been published and disseminated to the using units:

(1) After each fifty hours of operation, the air breather filter on the actuator hydraulic fluid tank will be cleaned with solvent and blown dry with compressed air.

(2) At a minimum of thirty-day intervals, the actuator hydraulic fluid tank will be removed from the generator and cleaned thoroughly with solvent, followed by a rinsing with hydraulic fluid in order to remove all traces of solvent. After replacing the hydraulic fluid tank, the actuator will be flushed with clean hydraulic fluid by "bleeding" of the actuator. (Note: Extreme care will be taken to prevent any foreign matter from entering and contaminating the fluid in the tank while it is being filled.)"

SOURCE: Headquarters, 6th Battalion, 56th Artillery

Universal Joints and Wheel Bearings.

"Item: A high failure rate was experienced for universal joints and wheel bearings.

Discussion: Universal joints and wheel bearings are failing due to the lack of lubrication.

Observation: Current lubrication orders (LO's) call for lubrication every 3,000 miles or once every six months. This interval is inadequate due to road conditions and rain. Vehicles should be lubricated as outlined in the appropriate LO each 1,000 miles or once every two months, whichever comes first."

SOURCE: Headquarters, 5th Signal Battalion

Modification U-1A Aircraft.

"Item: Engine Mount wear on U-1A Aircraft.

Discussion: Finite tolerances and inadequate care are causing excessive engine mount changes on U-1A aircraft. Published limits of

.005 wear on the engine mount allow almost no wear before repair is required. Engine inner cowling restraining clamps loosen rapidly due to vibration and allow the cowling to slide down to the ring mounts. On some aircraft the cowling continues to chaft on the mount, however, the condition is not serious. Mounts are being inspected every twenty-five hours."

SOURCE: Headquarters, 14th Aviation Battalion

Generator Failure.

"Item: Frequently generators fail electrically.

Discussion: Continuous operation, extreme climatic conditions, and dust contribute to a high generator deadline rate.

Observation: Generators should be converted to 3-phase output whenever possible. This results in smoother operation, lower internal heating, and an apparent significant reduction in generator failures."

SOURCE: Headquarters, 5th Signal Battalion

Centralized Maintenance.

"Item: Centralized Maintenance of 45 KW Generators.

Discussion: When a battalion-size unit must operate a large number of 45 KW diesel generators under the conditions of adverse climate, scattered direct support facilities and unpredictable parts replacement, centralization of second echelon maintenance is desirable. This battalion must keep thirty-three (33) 45 KW generators in full-time operation at ten (10) separate sites. All of these, along with thirty-two (32) generator repairmen, have been placed under the centralized control of the Battalion Motor Maintenance Officer. Repairmen live at the sites, perform all first and second echelon maintenance on the generators under the common standards established by the maintenance officer and get direct and rapid maintenance assistance from him on problems that are beyond their capabilities.

Observation: Centralization of 45 KW generator maintenance results in significantly lower deadline rates and improved responsiveness when generator troubles occur."

SOURCE: Headquarters, 69th Signal Battalion

Preventive Maintenance, 10 KW Generator.

"Item: Model SF 10.0 MD 10 KW Generators (S-4).

Discussion: Due to the large percentage of deadlined SF 10.0 MD 10 KW Generators, a technical representative from Saigon was asked to examine some of the deadlined generators. He found that the painted coating of the wiring leading to the stator was becoming bare due to sand being pulled through the protective cover over the stator and then hitting the wires. Then, moisture and vibration caused the wiring to short.

Observation: By raising generators of this model five or more feet off the ground, the chance of sand being sucked into the stators has been greatly reduced."

SOURCE: Headquarters, 41st Signal Battalion

Aircraft PM Checks.

"Item: Loss of Turbine Power.

Discussion: Operation of turbine-powered helicopters in dusty and grassy areas causes a deterioration of available power due to buildup of foreign matter on the turbine blades.

Observation:

(1) This unit has initiated a daily power check for its turbine-powered helicopters and has found that washing the turbine engine every 50 hours of operating time greatly reduces the power deterioration.

(2) This unit is attempting to expedite through supply channels the delivery of bearing filter kits for the air intake to the turbine. These kits will help prevent the induction of grass and leaves into the turbine. This should alleviate the power deterioration problem and also reduce the frequency of engine washing."

SOURCE: Headquarters, 14th Aviation Battalion

Signal Maintenance AN/TRC-24.

"Item: Maintenance of Equipment which is Operational Twenty-four Hours per Day.

Discussion: A definite deterioration had been noticed in circuits that were in operation for several months. Daily checks and system alignments continued to be satisfactory. A van, in its entirety, could not be taken off the air, so a program for replacement of chassis, one at a time, was initiated. The chassis that had been removed would then be taken to the maintenance shop for a complete check out. This system revealed that an excessive number of tubes, per chassis, failed to attain the minimum reading as required. Some tubes were intermittent and a few shorted. These tubes were still operational but functioned at very low efficiency. After completion of a van under this program, a definite improvement in circuits was immediately evident. As an example, the AN/TRC-24 from an AN/MRC-73 that had been operational for approximately seven (7) months required replacement of forty-six (46) tubes. The majority of these tubes failed to attain the minimum reading required.

Observation: The maintenance programs as outlined in the various technical manuals failed to solve the problem of deteriorating circuits. Maintenance on operating equipment must continue though the van must remain on the air."

SOURCE: Headquarters, 97th Artillery Group

d. Supply.

POL Resupply.

"Item: POL Handling Techniques must be Improved.

Discussion: Use of 55-gallon drums for high usage fuels is unsatisfactory due to time delays in handling techniques. When resupply is to be accomplished by road, use of 5,000-gallon tanker trucks is desirable. When resupply is to be by ALOC, resupply should be accomplished using 500-gallon drums and/or miniport 2,000-gallon bladders.

Observation: To accommodate large quantities of POL resupply, maximum use should be made of 500-gallon drums. The 55-gallon drums should be used only as a last resort or when small quantities of fuel are used."

SOURCE: Headquarters, 1st Infantry Division

Expendables.

"Item: Automatic Resupply of Expendables.

Discussion: Units with a supply mission which have arrived in this command do not have a readily available supply of expendable items such as box pallets, flat pallets, additional banding material and general operating supplies.

Observation: It would be beneficial for any unit with a proposed supply mission in this theater to have an automatic resupply of expendable items which are incident to the supply mission. A push package, similar to that used by combat units, would initially help alleviate the shortage upon arrival."

SOURCE: Headquarters, 98th Quartermaster Battalion (GS)

Transhipping Supplies.

"Item: Reduction of Pilferage.

Discussion: When supplies were first being broken down for shipment, they were loaded into large boxes or conexes and shipped to the location with only the supply tags and requisitions attached; however, many items were not reaching the requesting unit as the tags and requisitions were easily removed.

Observation: Items must be segregated by unit and packaged separately to cut down on pilferage and loss of documents through handling. These separate packages can then be placed in large containers for shipment."

SOURCE: Headquarters, 2d Ordnance Battalion (M&S)

Transhipping of Supplies.

"Item: Reduction of Pilferage of Sensitive Items.

Discussion: It has been discovered that some pilferage of sensitive items has been occurring during shipment to the operational detachment.

Observation: To reduce pilferage of supplies during shipment, all items are being boxed, banded and palletized with the sensitive items enclosed in the center. Requisition voucher numbers are used to mark the boxes instead of item descriptions. Lightweight sensitive items are being sent through the mail. It is expected that the loss of such items as pistols, binoculars, and medical supplies will be appreciably reduced."

SOURCE: Headquarters, 2d Ordnance Battalion (M&S) and Headquarters, 5th Special Forces Group

Systematic System to Review Requisitions.

"Item: Due-Out Review System.

Discussion: A large number of due-outs to the operational detachments accumulated and there was no systematic method established to review and reduce the due-outs to meet an acceptable demand accommodation rate.

Observation: A 120-day due-out review system was initiated. All requisitions that are over 120 days are returned to the requesting unit. If the unit determines that the item is still a valid requirement, the request is resubmitted and alternate methods of obtaining the item are examined. The reviews have resulted in a 50% reduction in the number of due-outs because the detachment has obtained the item by another means or the individuals on site at the time of review have decided that they no longer want the item."

SOURCE: Headquarters, 5th Special Forces Group

e. Transportation.

Prevention of Cargo Slippage.

"Item: Cargo Tie-Down Devices, Aircraft Type, Strap.

Discussion: After nine (9) months of continuous cargo hauling of various types and shapes and experimenting with many different kinds of tie-down devices, it has been determined that the cargo tie-down device, aircraft type, strap is best from a safety point of view.

Observation: These mechanical tie-down devices have proven to be a time saving and highly regarded safety device. The tie-down straps can be

easily attached to a 12-ton semi-trailer and can be quickly secured into position. Unlike rope, these tie-down devices prevent any slippage or shifting of cargo. Five (5) tie-down devices of this type can secure any load normally hauled by a 23-ton semi-trailer."

SOURCE: Headquarters, 11th Transportation Battalion (Terminal)

Beach Clearance.

"Item: Use of Line Haul Trucks for Beach Cl e.

Discussion: Truck line haul directly from the each to inland consignee is ideal, provided line haul trucks are readily available. Delay in truck arrival causes reduced lighterage turnaround and/or double handling by stevedore personnel.

Observation: Careful coordination of cargo discharge and line haul truck availability is essential for effective beach clearance."

SOURCE: Headquarters, 394th Transportation Battalion (Terminal)

Operational Precautionary Measures.

"Item: Vehicle overload.

Discussion: This unit has learned by experience that the allowable 100% overload for combat vehicles should apply only when they are driven on hard, smooth-surfaced roads. When operating on secondary roads, cargo trucks, loaded above rated capacity, will sustain damage to the frame, springs, and steering linkage. Vehicles used to transport ammunition are of specific concern. Most types of ammunition will overload a vehicle before the volumetric capacity is reached.

Observation: The necessity of taking all precautionary measures to prevent overloading should be emphasized."

SOURCE: Headquarters, 394th Transportation Battalion (Terminal)

Transshipment.

"Item: Port facilities and limited means of air and sea transportation hinder the ability to maintain Stockage Objective in individual ammunition depots.

Discussion: Even though in-country ammunition stocks are adequate to meet requirements, it is necessary in many cases to transship ammo from one Support Command to another or to forward support areas to build up for the support of current combat operations. Some intra-theater movement can be minimized by careful control of incoming vessels to include diversion of ships to different ports and priority unloading. However, due to overtaxed port facilities, diversions upset the timetable of other incoming shipments to the same port. Vessel restriction to a one or two port discharge makes transshipment necessary in many cases when a vessel carries only one type of ammo. Since most roads are not available for use, most transshipments are accomplished by the use of air or water movements. Air movements are of necessity restricted to the movement of high priority, low tonnage items and are not adaptable for cross-leveling stocks.

Observation: Transshipments are and will continue to be a problem for sometime. Careful control of incoming shipments must be continued to assure proper distribution of ammo assets."

SOURCE: Headquarters, 1st Logistical Command

Air Transportation.

"Item: Use of C-130's as Flying Tankers.

Discussion: A C-130 aircraft can be outfitted with 2 miniport refueling tanks (2,000 gallons each) and serve as a bulk refueler to forward areas. This system is good in that it allows direct delivery of bulk product from plane to bulk refuelers or to bulk storage and does not require a quantity of containers as in the case of the 500-gallon non-vented containers. The system is, however, slower than the use of 500-gallon non-vented containers in the turnaround time required.

Observation: Petroleum distribution courses should cover the strengths and weaknesses of the flying tanker system of bulk fuel delivery."

SOURCE: Headquarters, 1st Logistical Command

Light and Medium Truck Companies.

"Item: WABTOC trailers increase efficiency of truck units.

Discussion: Medium truck companies can be issued a 100% supplement of semi-trailers with authority of Theater Commander. Light truck companies can be supplemented to allow all task vehicles to have a trailer. Experience has shown that units with WABTOC supplemented trailers are more flexible and productive.

Observation. All truck units should arrive in-country with WABTOC trailers or as soon thereafter as possible be issued WABTOC trailers."

SOURCE: Headquarters, 1st Logistical Command

Modification of M51A2 Truck.

"Item: Power steering pumps for M51A2 trucks.

Discussion: This unit experienced a high rate of failure of power steering pumps on M51A2 trucks. An adapter plate was manufactured which permitted mounting of the power steering pump from the M52 truck. This has proved satisfactory.

Observation: The power steering pumps of M51A2 trucks needs modification to provide a safer vehicle which will withstand normal field use."

SOURCE: Headquarters, 87th Engineer Battalion (Construction)

Required Equipment for Roll-on/Roll-off Operations.

"Item: If Roll-on/Roll-off operations are to be conducted, the vessels involved must have special equipment.

Discussion: RO/RO vessels are supposed to be equipped with special handling equipment. This equipment consists of a spotting dolly, Coleman Tractor, and two (2) Walters Tractors. To date, the full complement of equipment has not been available and in all cases where the equipment has been available, there have been mechanical problems. In addition, the Walters Tractors have not had enough power to pull loaded trailers up the ramps. A tandem tow utilizing an M-52 tractor attached to the Walters Tractor was necessary. An M-52 tractor raises vans to a height that will not clear the overhead on exit from the lower hold.

Observation: The amount of time on berth for RO/RO vessels could be reduced if adequate special equipment is placed aboard each vessel to assist in the discharging and loading of trailers."

SOURCE: Headquarters, 4th Transportation Command

3. Signal Communications.

a. HF Radio Modulation Expedient.

"Item: MD-239 modulators fail frequently.

Discussion: The unit has had a high deadline rate of MD-239 modulators in the AN/GRC-26.

Observation: In an emergency, and if all MD239 modulators are inoperative, a TH-5 can be used to audio shift the T-368 transmitter for effective RATT operations. In such case, each station in the net must be using the TH-5 arrangement."

SOURCE: Headquarters, 5th Signal Battalion

b. Electronic Equipment.

"Item: Effect of heat, dirt, and humidity upon electronics.

Discussion: Electrical equipment by its very nature is sensitive to many of the elements, not the least of which are heat, dirt, dust and humidity. To combat these enemies of electronic equipment, there are a variety of items within the inventory of the United States Army. Air-conditioners effectively combat all three problems. A combination of electric fans and clean filters are a good substitute for air-conditioners. First, echelon maintenance helps prevent problems and errors and lessens the chance of a major breakdown. A shelter constructed over and/or around a shelter or van helps to overcome the heat problem. The Army has also developed semiconductors substitutes for a few tubes that constantly fail due to excessive heat.

Observation: Ingenuity along with initiative, and use of replacement parts, reduce circuit outages due to tropical climate."

SOURCE: Headquarters, 69th Signal Battalion

c. Measures to Reduce the Effect of Tropical Climate on Teletype Circuits.

"Item: Climate causes circuit outages of TH-5/TG.

Discussion: Extreme heat, high humidity, and dust have been found to be factors contributing highly to teletype circuit outages. It has been noticed that the terminal telegraph TH-5/TG, which produces a large quantity of heat itself, is susceptible to the hot, humid weather of Vietnam. To alleviate the problem, it is necessary to provide cooler operating conditions. The following is a list of suggestions to provide a cooler atmosphere.

(1) Air condition the vans and huts where TH-5/TG's are used.

(2) In terminal telegraph AN/MSG-29, if TA 182/U's are not needed, remove them to allow more air to circulate around and through TH-5/TG.

(3) In AN/MSG-29 or other types of huts or vans where TH-5/TG is mounted flush with ceiling, lower shelf when possible to allow rising hot air to escape. It would also be helpful to have this shelf made of perforated material to allow air to circulate up through TH-5/TG.

(4) Move TH-5/TG to cooler area if circuit characteristics are not changed by longer wires and the move does not create a security violation.

Observation: When steps have been taken to cool terminal telegraph TH-5/TG circuit outage drops considerably."

SOURCE: Headquarters, 69th Signal Battalion

d. VHF Circuits.

"Item: Emergency Power Source for VHF.

Discussion: Gasoline generators PE-75 are being used at each firing battery's VHF station as an emergency power source in the event that the firing units' power generators are down for more than a few minutes. The organic generators (10KW) for the VHF's have been very unreliable due to the lack of qualified maintenance personnel and parts needed to maintain them in operating condition. At present, the firing unit's main power generators are being used to power the VHF stations.

Observation: The PE-75 power unit is simple to maintain and provides reliable power for extended periods. Experience has proven that downtime

has been greatly reduced on VHF circuits due to this emergency power source."

SOURCE: Headquarters, 6th Battalion, 71st Artillery

e. VHF Systems/Planning and Engineering.

"Item: Practical experience in planning and engineering VHF systems has proven that techniques taught in the service schools are not necessarily valid, and that these techniques should not be considered as hard and fast principles.

Discussion: A great number of VHF systems, established in the II CTZ, would not work if profiling and frequency engineering principles are accepted as gospel. Higher frequencies in C band sometimes give better obstacle gain systems than A and B band frequencies. Systems have been established over terrain that should have completely blocked or absorbed the signal. Other unusual techniques have been used; for example, bending the antenna skyward has been successful in some instances in overcoming obstacles in the near foreground of the antenna. The technique of bank shots in valleys is also working well.

Observation: VHF systems planners and operators should use ingenuity and take advantage of the unusual propagation effects that appear to exist in Vietnam. A research program by appropriate DA agencies may provide added valuable techniques in VHF systems engineering."

SOURCE: Headquarters, I FFORCEV

f. Color Coding of Cables.

"Item: Cable Installation.

Discussion: In many areas of Vietnam, large engineer construction efforts are under way. At the same time, communications must be provided. As a result of the construction efforts, many communications cables have accidently been cut by construction equipment, trucks, etc. In order to minimize outages and decrease restoration time, cable should be marked.

Observation: Since plastic cable tags are practically nonexistent in

Vietnam, color coding cables with spray paint has been an effective expedient."

SOURCE: Headquarters, 41st Signal Battalion

g. Teletypewriter Transmitter.

"Item: Defective Sensing Device - Teletypewriter Transmitter AN/FGC-70X.

Discussion: Sensing Device on Transmitter AN/FGC-70 has tendency to malfunction; i.e., failure to turn off motor unit upon completion of tape feed. This malfunction has caused excessive overheating of the motor unit and will eventually cause arcing of the motor winding.

Observation: The difficulty is best rectified by personal supervision over the apparatus. The practice of having the shift supervisor continually check the performance of the transmitters to insure that they are operating correctly has proven most effective in eliminating this deficiency. A close record is maintained on machines that repeatedly fail, and these have been promptly removed for maintenance."

SOURCE: US Army Strategic Communications Command (Vietnam)

h. HF Radio Frequencies.

"Item: Reliability of HF frequencies.

Discussion: It has been experienced that even with careful planning and proper use of HF propagation charts, frequencies still prove too erratic to schedule QSY times based on chart data.

Observation: Careful planning of frequencies is of the utmost importance, but operators must report fading immediately and QSY frequencies only when they fade. Several frequency changes may be required to find a workable frequency at any given time. Close coordination between NCS and net stations is imperative for good QSY procedures and net efficiency."

SOURCE: Headquarters, 9th Signal Battalion

i. Transmitter AN/FGC-70X.

"Item: Arcing Transmitter AN/FGC-70X.

Discussion: The nonsynchronous motor of the transmitter AN/FGC-70X developed severe arcing causing rapid pitting of the contacts.

Observation: The fabrication of a variable 16-18 ohm, 300 watt resistor from the heating element of an electric iron, and installing the resistor in series with the contacts reduced the arcing to a level that permits continued operation until synchronous motors can be obtained."

SOURCE: USA Strategic Communications Command (Vietnam)

j. Patching Panels.

"Item: Maximum use of normal-through initial circuit arrangement in communication patching panels SB-611/MRC and SB-675/MSC.

Discussion: When installing a communication patching panel in a relatively fixed location, it has been proven to be well worth the time and effort to collate circuits on a frame or on junction boxes to allow normal-through circuitry in the patch panel. This procedure simplifies future patching and allows for easier identification of circuits than on a crowded patch board.

Observation: Planning for normal-through circuitry pays dividends in ease of monitoring, trouble shooting and circuit rerouting."

SOURCE: Headquarters, 69th Signal Battalion

k. Grounding.

"Item: Equipment Grounding.

Discussion: Difficulty has been encountered in obtaining a good ground in many of the signal sites located throughout Vietnam. Rain improves grounding, but in many instances an unsatisfactory ground still exists. To correct this problem, ash fill was placed around the ground rod and a ferrous salt solution added daily. This process produced a stable ground potential.

Observation: An adequate ground can be obtained by utilizing an improved grounding technique."

SOURCE: Headquarters, 69th Signal Battalion

l. Terminal Telegraph TH-5/TG.

"Item: Telegraph terminal TH-5/TG operation in HF remote systems.

Discussion: The use of Telegraph Terminal TH-5/TG in HF radio to communications center remote systems was first used in two-wire mode of operation. Most of the systems would garble after a short period of operation. When the remote systems were changed to four-wire mode, operation proved to be much better.

Observation: The reliability of the TH-5/TG in four-wire mode improves operation sixty (60) to seventy (70) percent over the two-wire mode."

SOURCE: Headquarters, 69th Signal Battalion

m. Tech Control Vans.

"Item: Fabrication of Tech Control Vans.

Discussion: There was an emergency requirement for tech control vans. None were available in the command.

Observation: Two were fabricated using resources within the command. "M" Details (Jack Assembly) were required for VF patching. No "M" details were available. "N" details (Jack Assembly) were modified to function as "M" details, making possible the construction of two control vans within 19 days to fulfill an urgent requirement."

SOURCE: USA Strategic Communications Command (Vietnam)

n. Switchboard Cord Life.

"Item: Excessive Wear of Switchboard Cords.

Discussion: The arrangement of local lines and trunk appearances on a multi-position switchboard has a direct effect on the life expectancy of switchboard cords. Cord wear was excessively high in two central offices arranged in four (4) panel multiples because trunk groups appeared only on every other panel. By relocating the trunk groups to appear on each panel, the reach of the operator was shortened and cord wear was considerably reduced.

Observation: The life expectancy of telephone switchboard cords of multi-position switchboards can be considerably lengthened by relocating the trunk groups to appear on each panel."

SOURCE: Headquarters, 69th Signal Battalion

Section IV

A SUMMARY OF LESSONS LEARNED
"GENERAL"

1. The Environment.

a. Climatic Effects.

"Item: Open Storage.

Discussion: Current practice for open storage is to prepare the surface by compacting several thick layers of laterite, a low grade ore and clay type soil. In an effort to conserve storage space, palletized rations were stacked three pallets high. Similarly, POL drum products were stored four drums high in some cases.

Observation: Laterite surfaces which become wet in tropical environment do not provide a stable load-bearing surface. This results in a shifting of weight and the ultimate collapse of the stack of rations or row of drums. The optimum height for rations is two pallets high and drums should not be stored higher than three."

SOURCE: Headquarters, Supply and Service Battalion (DS)(Prov)

b. Heat Reduction.

"Item: Reduction of Heat in Conex Containers.

Discussion: Due to the extreme heat generated in this climate, some units have painted the tops of the conex containers white in order to reflect the heat and lower the internal temperatures. It is common for conex containers to be utilized as mail rooms and the white surfaces provide some relief for the mail clerks.

Observation: Conex containers which are frequented by personnel or are used for the storage of items susceptible to high temperatures should be painted so as to reflect heat."

SOURCE: Headquarters, 98th Quartermaster Battalion (GS)

c. Vietnamese Driving Customs.

"Item: Drivers Anticipation of Vietnamese Driving Actions.

Discussion: After many thousands of miles and many months of driving, the 5-ton truck drivers have observed many actions peculiar to Vietnamese drivers alone.

Observation: Vietnamese military drivers in most cases will drive more to the center of the road than to the right side. It has been found that it is better for the American driver to slow down and pull to the right as much as possible rather than try to hold ground and force the Vietnamese driver to the right. The Vietnamese military driver has a bad habit of tailgating and it has been found safer to pull over to the right and allow them to pass rather than speed up to get away from them."

SOURCE: Headquarters, 11th Transportation Battalion (Terminal)

2. Deployment.

a. Deployment.

"Item: Deployment of a Medical Group.

Discussion:

(1) This headquarters strongly supports the inclusion of the Medical Corps commanding officer in the advance party of all patient care units. Headquarters, 68th Medical Group has now received units with MSC Executive Officer in advance party or with MC Commander. There are usually questions of facility design, staff supplementation, medical supply and equipment to be answered by the advance party which are best handled by the MC Commander.

(2) The 36th Evacuation Hospital, despite the disadvantages of early packing and shipping of equipment, late fill of personnel and some apparent confusion has performed extremely well to date. It was fortunate in having a partially completed set of temporary buildings available upon arrival. It was doubly fortunate in having very vigorous assistance from Vung Tau Support Command which continuously gave the hospital priorities for resources needed. Its accomplishments to date demonstrate that a hospital which on 1 December 1965 was about as unready and undermanned as a hospital could be can be deployed and rendering effective care

120 days later. The many who contributed to this achievement deserve considerable credit.

(3) The delayed deployment of professional complements for hospitals has been previously considered. In the case of this hospital, the time after arrival of professional complement on 10 March 1966. This was about optimal lead time. Longer would bring boredom and loss of morale to professional staff. Rushing them to work immediately upon landing is possible but leads to heightened confusion, duplications of errors already learned by others and early fatigue. Recommended timing for the arrival of professional complements to be the expected operational date of facility which, in Vietnam, has depended upon engineer construction. Ten to fifteen days prior to anticipated operational date is recommended for landing of professional complement. This phasing should be feasible during the later and more orderly phases of an operational buildup.

(4) Based on experience with other hospitals, the 36th Evacuation Hospital was provided with augmented equipment for tropical operation from in-country resources, including additional refrigeration, fans, air-conditioning, ice making machines, and power-generating capacity. The magnitude of the augmentation is similar to that reported for the 93d Evacuation Hospital.

(5) The reported confusion as to final destination reflects in part difficulties in communication of decision changes up through higher echelons to DA.

Observation: The subject of timely revisions of Medical Equipment Sets will be continuously considered based on experience in Vietnam. As equipment in excess of TO&E is requested by each unit, its justification is reviewed in the medical command echelons. Certain consistent patterns are evolving which, after more experience, will permit recommendations for increased items to be standardized. After another half year of observation, the validity of these recommendations should be firm and will be proposed by this headquarters."

SOURCE: Headquarters, 68th Medical Group

b. Publications.

"Item: Overseas deployment with sufficient publications.

Discussion: A tendency to leave seldom used publications and regulations

in CONUS should be avoided whenever possible. It is not unusual to wait 60 to 90 days after placing a publications order to receive requisitional items. Requisitions must be sent to either Japan or back to CONUS, and the delay is almost inherent.

Observation: Units departing CONUS should be encouraged to bring all publications and regulations available upon departure."

SOURCE: Headquarters, 70th Medical Battalion

c. Climatic TOE Item.

"Item: Tent liners, tent stoves, and space heaters.

Discussion: A medical unit deploying to Vietnam should not be required to bring with it all TOE items merely because they are on the unit TOE. Cold weather items such as tent stoves and tent liner is a good example. Tent liners provide insulation against heat as well as cold. When medical units are required to use tents, a tent liner will make the tent a more comfortable environment for patients and personnel.

Observation: TOE items should be examined with care to determine their mission usefulness in Vietnam. When not needed, they should not be brought to Vietnam. All deploying medical units bringing tents should be sure to bring the liners for their tents."

SOURCE: Headquarters, 32d Medical Depot

d. Packing Lists.

"Item: CONEX Packing List.

Discussion: Upon receipt of CONEX containers at Bien Hoa, it was found that packing lists prepared at Fort Hood were inadequate to determine the contents of each CONEX. Therefore, valuable time and man-hours were lost unpacking and searching CONEX containers to locate items of immediate needs.

Observation: A detail packing list should be prepared in sufficient copies to place one in each CONEX container, one retained by the individual section chief concerned and one by the unit supply officer."

SOURCE: Headquarters, II Field Force Vietnam

e. Tentage.

"Item: Tentage.

Discussion: The shortage of general purpose tents in the local supply system presented a problem in obtaining sufficient tentage to billet the main body personnel.

Observation: Tentage for this purpose should be shipped in the Red TAT."

SOURCE: Headquarters, II Field Force Vietnam

3. Base Camps.

a. Unit Locations.

"Item: Replacement Processing Centers.

Discussion: Replacement facilities in combat zones are characterized by large numbers of unarmed troops billeted in combat areas. When these units are located near vital supply facilities or prime military targets (such as helicopter pads), disastrous results can occur in the event of an enemy attack on the prime target.

Observation: That replacement type units and similar groups should be located in secure areas, but a reasonable distance from petroleum storage, aircraft parking, large headquarters, and like locations."

SOURCE: Headquarters, II Field Force Vietnam

b. Power Plants.

"Item: Generator Loading.

Discussion: Investigation of several power plants has revealed that most generators are operating at less than 50% of rated capacity. This is detrimental to the unit and shortens life span by causing excessive wear on parts. Generators are better utilized by operating them at near capacity with small overloads for short periods of time.

Observation: Generators should be installed based on peaking loads and not on total connected load which is never obtained."

SOURCE: Headquarters, 1st Logistical Command

4. Training.

a. Communications Training.

"Item: Additional MOS Training.

Discussion: The buildup of US and Allied Forces in the Republic of Vietnam has placed a great requirement upon the Signal Corps to provide the necessary communications. The communication network that has been installed in the Republic calls for highly-trained personnel to operate and maintain the various types of complex equipment. One such MOS is 31M20/31M40, radio relay/carrier attendant. Presently, personnel selected for training as a 31M receive 8 weeks instruction at Fort Gordon, Georgia, covering the basic installation, operation, and maintenance procedures for tactical radio/carrier equipment. Upon assignment to a unit, these EM must undergo extensive additional MOS training to become proficient operators. Items such as voice/telegraph interfacing, operation of power generators, to include a limited knowledge of troubleshooting and repair methods, and circuit trouble isolation/restoration measures are a part of this additional training. Normally, this training can be accomplished through OJT; however, the situation in Vietnam prevents this type training as technically proficient personnel are needed to operate and maintain the vital communications links immediately upon arrival in Vietnam.

Observation: To better train personnel, the following suggestions are submitted:

(1) The 31M course at Fort Gordon, Georgia be extended from 8 to 10 weeks. The additional instruction period could be utilized to familiarize the student with the items mentioned above.

(2) That a MOS refresher course be initiated in Vietnam to further train these personnel. This concept has been utilized in USAREUR for the last several years with excellent results."

SOURCE: Headquarters, 41st Signal Battalion

b. Operators Training.

"Item: Operators of Military equipment had insufficient training to yield maximum output of their equipment when committed to a full-time mission.

Discussion: Operators of equipment were not sufficiently trained nor had sufficient practice in operating the equipment they were assigned to maintain and operate. This resulted in a higher than expected deadline in

equipment. This could have been avoided had these individuals been required to operate and maintain this equipment under sustained operation prior to deployment. This operator weakness was especially prevalent in truck drivers operating in deep sand; construction equipment operators of full-tracked tractors, wheeled tractors, scoop loaders; and rough terrain MHE operators. This lack of training, in addition to increasing mechanical failures, impaired the mission by reducing the amount of work produced. One prime example was an Engineer heavy equipment operator who graduated from service school at Fort Leonard Wood, Missouri. When asked how many hours he had actually operated a full-tracked tractor before arriving in Vietnam, the operator stated, "about 8 hours."

Observation: Personnel should be given more training (practice) in operating equipment under extreme conditions prior to being sent to Vietnam. This training should be given to the individual in service schools and units should undergo refresher training prior to deployment. This training should be on equipment similar to that utilized in this command."

SOURCE: Headquarters, US Army Depot, Cam Ranh Bay

c. Tactical Training for Quartermaster Units.

"Item: Preparation for Overseas Movement.

Discussion: Quartermaster support units receive very little, if any, tactical training prior to deployment overseas to a combat zone. One unit of this battalion (624th QM Co (DS)) requested such training prior to deployment with emphasis on defensive tactics. The unit was assured that support type units would be well protected and, therefore, did not need this type of training. However, personnel of this battalion have been involved frequently in armed convoys and have been integrated into infantry perimeters of defense in their own base camps. All support units provide their own security and man their own defensive positions.

Observation: All personnel in support type units should be given adequate training in defensive tactics and techniques prior to deployment from CONUS."

SOURCE: Headquarters, Supply and Service Battalion (DS)(Prov)

d. Operator Training.

"Item: Training Motor Vehicle and Generator Maintenance.

Discussion: Preventive maintenance on vehicles and generators presents a major problem to commanders at all levels. Replacement personnel of all grades lack adequate training in the proper maintenance procedures outlined in individual equipment technical manuals and TM 38-750. This lack of training has resulted in a significantly higher equipment down-time on equipment urgently needed to meet extensive communications requirements. Operational commitments tax the unit's capability to provide this additional training in the field.

Observation: Replacement personnel should be required to be fully aware of operation maintenance requirements prescribed in TM 38-750 and applicable TM's prior to deployment."

SOURCE: Headquarters, 41st Signal Battalion

5. Civil Affairs/Civic Action.

a. Civic Action.

"Item: Civic Action.

Discussion: Civilian personnel without bonafide illnesses are showing up for medcap treatment.

Observation: Discretion must be used in issuing free MEDCAP supplies to Vietnamese healthy civilians who request treatment and thereby delay treatment of the bonafide sick."

SOURCE: Headquarters, 2d Brigade, 25th Infantry Division

b. Troop Support for Rice Harvest.

"Item: Rice harvest Tuy Hoa.

Discussion: A plan was formed to allow harvesters to carry the rice to designated collecting points. At these points a private Co-Op would purchase the rice from the harvester and the rice would then be transported to government warehouses in secured areas. The individual harvester would be permitted to retain enough for the needs of his family.

In practice, these procedures were not workable. Efforts to secure the harvest on the part of the troop units were successful. However, the efforts to buy the rice from the harvester failed completely. In order for the Co-Op to purchase the unmilled rice at or below the government ceiling price, it could not afford to pay the harvesters what they wanted. Consequently, the bulk of the rice remained in the hands of the harvesters.

When it became apparent that the Co-Op system would not work, the province chief arranged for the harvesters to bring the rice into one of the designated hamlets which was located in a secure area. Thus, the bulk of the rice was moved into a secured area in the vicinity of the city of Tuy Hoa.

The province chief stated that he was going to control the rice by insisting that everyone declare the amount on hand and then check to insure that no excess amounts went undeclared. This was considered inadequate.

Observation: It was recommended that in the future, prior to committing troops to the security of a rice harvest, that a practical plan for more detailed coordination be made among all interested agencies prior to the completion of detailed plans by any of them. MACV should encourage the GVN to give province chief legal authority to take and store the rice for the owner giving him a credit for the rice he gives up for storage. He should be permitted to retain on hand only enough for his family for a limited time (one month) and he should be made to adequately justify any excessive withdrawal of rice from the central storage facility. Price controls should be established to avoid speculation and severe penalties imposed for violations."

SOURCE: Headquarters, I Field Force Vietnam

c. Medical/Administration.

"Item: Adequate Interpreters for MEDCAP Program.

Discussion:

(1) The necessity for adequate interpreter service at all MEDCAP Programs is essential. The best of American medical aid is near worthless without the presence of skilled interpreters. Valuable medical time has been lost because of failure to have sufficient qualified interpreter personnel present.

(2) It would be extremely valuable if MEDCAP program could be operated through the normal siesta period. When medical personnel travel long distances to perform MEDCAP programs, it is disheartening for the medical personnel to have to sit through a 2½ to 3 hour siesta during the heart of the day. It would appear that patients are not averse to continuing treatment and examination through the siesta but objections are from local assistants.

Observation: It is essential to establish Refugee Control Points near the tactical operational area and to evacuate refugees to these collection points as soon as the tactical situation permits. When available, helicopters provide an excellent means of evacuation. Speedy evacuation releases the commander of the burden caused by the presence of civilians in the operational area, and reduces the chance of noncombatant casualties. Any RF/PF forces in the area are an excellent source of security for the refugees until and during evacuation."

SOURCE: Headquarters, 1st Brigade, 101st Airborne Division

6. Psychological Operations.

a. Psychological Operations.

"Item: Use of Leaflets.

Discussion: Leaflets are not too effective as a large percentage of the farmers are illiterate. They should be passed out to villagers literate enough to read them to other villagers or by attached interpreters. Public address sets mounted in vehicles or helicopters with Vietnamese language tapes are more effective than leaflets."

SOURCE: Headquarters, 2d Brigade, 25th Division

b. Use in Tactical Operations.

"Item: Application of Psychological Warfare efforts.

Discussion: There is a psychologically propitious moment when an enemy soldier is mentally prepared to rally. This moment varies with each individual and with the tactical situation. Therefore, constant exposure to allied propaganda efforts is necessary to insure that an enemy is presented with a rallying appeal at the time most favorable for him.

Observation: In order to obtain maximum results, the enemy or potential enemy must always be kept on the psychological defensive by continuous pounding with leaflet and loudspeaker appeals, especially in conjunction with tactical operations."

SOURCE: Headquarters, 1st Brigade, 101st Airborne Division

c. Broadcasts.

"Item: Use of aerial loudspeaker broadcasts.

Discussion: Because atmospheric conditions such as temperature, surface winds, etc., can adversely effect the quality and clarity of aerial loudspeaker broadcasts, it is imperative that the broadcast be checked with friendly ground elements closest to the target area to insure effectiveness.

Observation: The psychological aircraft must effect coordination and communication with friendly ground elements to adjust his broadcast altitude and volume prior to each mission."

SOURCE: Headquarters, 1st Brigade, 101st Airborne Division

7. Personnel and Administration.

a. Adjusting the DEROS Humps.

"Item: DEROS Humps.

Discussion: The input of numerous company size units in a short period of time has caused unfavorable peaks in DEROS within subordinate units. Internal shifts are ideally made soon after the new unit arrives. The established companies can absorb new arrivals in rather large percentages (up to 30% or 35%) and soon regain full mission capacity. This procedure causes minimum impact on operational capability of old and new units and assists in reducing these peaks.

Observation: Immediate adjustment through transfer of personnel, both officers and enlisted, must be made at battalion level soon after arrival of new aviation units."

SOURCE: Headquarters, 17th Aviation Group and Headquarters, 52d Aviation Group

b. Logistics.

"Item: Shortage of Personnel, AMMC.

Discussion: Without sufficient trained personnel on hand to accomplish the assigned mission, short cuts must be taken which have drastic effects later. In the area of aircraft supply in Vietnam, many required functions could not be performed due to the lack of sufficient trained warehousemen, stock records personnel, EAM operators, and supervisors. This means improper utilization was made of the limited storage space available. To correct this at a later date requires many additional manhours and in areas such as demand data reconstruction was impossible.

Observation: Many of the problems existing today in aircraft supply support in Vietnam results from the critical shortage of a sufficient number of qualified personnel assigned in the past. Programing the required trained personnel into a supply unit must be accomplished prior to expanding into a large scale operation supported by an EAM operation. Each area must have personnel ready to assume the required functions or the overall system will not provide the desired results."

SOURCE: Headquarters, 34th General Support Group (AM&S)

c. Understrength Units.

"Item: That no understrength units be sent to a Theatre of Operations with the assumption that they will use indigenous labor until it is certain that such labor is, in fact, available.

Discussion: An Engineer Supply Point Company was sent to Cam Ranh Bay organized as a Type B unit, i.e., with only sufficient US personnel to supervise a large number of indigenous personnel. This unit never received a native labor force because virtually none was available. As a consequence, this unit was unable to perform its mission without large assignment of labor details from other units which impaired their missions. Furthermore, efficiency of the Supply Point Company suffered from the traditional problems attendant on temporary detail type personnel who were sent on the detail because of their uselessness in the parent unit, etc.

Observation: That Type B unit should be organized and used only where there is an adequate labor market to provide the necessary native labor."

SOURCE: Headquarters, US Army Depot, Cam Ranh Bay

d. Unit Activation.

"Item: Early reporting date of personnel to a newly activated HHD is a waste of manpower.

Discussion: A headquarters detachment can be activated, equipped and supplies obtained and necessary administration accomplished by a supply officer, administrative officer, and five (5) or six (6) enlisted personnel. In the 44th Medical Brigade Headquarters, the service of 85% of officer personnel was lost to full military use for 2-3 months. Experience of this brigade headquarters indicated that personnel are not required at their post of activation until 30 days prior to deployment. POM/POR requirements should be fulfilled at home station prior to transfer to alerted units.

Observation: Command and control detachments (TOE 8-500 series) do not need personnel fill until 30 days prior to deployment."

SOURCE: Headquarters, 44th Medical Brigade

e. Finance.

"Item: Payroll for Class A Agents.

Discussion: The requirement for Class A Agents to report to the Division Finance Officer to obtain their payrolls results in excessive travel time by individual agents.

Observation: Finance Courier Teams have been provided by the Division Finance Officer to bring payrolls to the base camps. This has resulted in a savings in man-hours and aircraft utilization and has delivered the payroll to the Class A Agent on a more timely basis."

SOURCE: Headquarters, 1st Infantry Division

f. Administrative Contract Team.

"Item: Coordination on administrative matters between the battalion and the firing batteries is hindered by distance and poor communications.

Discussion: The tactical situation frequently dictates the deployment of the firing batteries to locations distant from the battalion and distant from each other. Communications, more often than not, are non-existent with these outlying positions. This situation can result in missing deadlines on reports to higher headquarters, unused promotion allocation, unused R&R allocations, and delayed passage of emergency matters of a private nature.

Observation: A contact team approach has met with some success in maintaining administrative contact with distant units. The team, composed of staff representatives, travels to the batteries to resolve administrative problems or to assist in any way possible.

SOURCE: Headquarters, 1st Battalion, 30th Artillery

APPENDIX I

"LESSONS LEARNED IN VIETNAM,
29 JANUARY - 28 FEBRUARY 1966"

Lessons Learned in Vietnam, 29 January - 28 February 1966 was published by Commanding Officer, 2d Brigade Task Force, 25th Division in March 1966. This brigade is located at Cu Chi along with other combat elements of the 25th Infantry Division.

ENEMY TECHNIQUES

1. The VC as an Enemy. Engagements with the Viet Cong Forces indicate that they are fairly well trained, organised and adequately equipped for their mission. Marksmanship has generally been excellent. Viet Cong probing and harassing actions against friendly CP's and perimeter security forces have been conducted between sunset and 2400 hours or from 0500 hours until BMNT. Contact with the Viet Cong at other hours has been a result of US initiated action or from isolated snipers as a rule.

The enemy's general tactic is the ambush, employing mortars, machine guns and rifle grenades. If cornered, the Viet Cong will fight but more often they will disperse into small groups and melt into the jungle or countryside to fight another day.

2. Location of VC Forces. When conducting sweeps, ambushes or saturation patrol operations, particular attention must be paid to trails, draws, bases of hills and streams. During darkness, the Viet Cong travel trails almost exclusively and are normally thoroughly familiar with all the trails. Viet Cong camps are generally close to major trail networks and water. Constant pressure can be applied to the guerrilla by hitting his camp sites and keeping him off guard.

3. VC Firing Positions. Viet Cong firing positions are often characterized by outstanding camouflage, good cover to include small caves in foxholes as protection against overhead fire, small firing ports, ideal site selection such as strategically-located trees for snipers or low grazing fires. Often the Viet Cong dig right into the middle of bamboo clusters or into the backs of giant ant hills. These likely areas should be the targets for reconnaissance by fire. Spider holes along rice field dikes are often used by the VC when it is to his advantage. Stream banks in contested areas are lined with trenches and fighting holes and provide a concealed escape route for harassing and delaying forces.

4. Orientation of VC Defenses. The Viet Cong make good use of terrain and orient their trench works and defense parallel to friendly defensive position and most probable avenue of approach into the area. For example, in Operation PADDY BRIDGE, a recently-conducted search and destroy operation, friendly forces were required to attack VC fortifications frontally as foot movement in any other direction would have exposed our units in open terrain for an excessive distance. Such maneuvers must closely follow the air and artillery preparation. In planning operations units must make full advantage of US superior mobility in the form of armored personnel carriers or helicopters to attack Viet Cong defenses in least heavily defended direction. Extensive trench system and fighting holes line the majority of the stream banks, usually well concealed under trees and bushes.

5. VC Fires. This Brigade has found that when the Viet Cong open fire, it is generally from at least two directions and often from three. Fires are continued until engaged by fire or a friendly element is maneuvered toward the direction of fire. Immediate reaction against these harassing VC fires has resulted in suppressing the enemy fires and minimized friendly casualties. It is felt that the Viet Cong are quick to detect US weaknesses such as "bunching up" and the overextension of a position, then react with grenades or mortars. During MEDEVAC of casualties in an unsecure area, the Viet Cong has attempted to maintain contact by all available forces. In addition, mortars and rifle grenades have been fired into the evacuation area. Action must be taken by friendly forces to secure the LZ from enemy ground fire prior to the landing of MEDEVAC helicopters.

6. VC Snipers. The Viet Cong are very skillful in sniping from well-camouflaged tree and ground positions. They normally get off a quick series of well-aimed shots and then either cease fire or move to a new location. Experience has shown that the Viet Cong frequently employ snipers in three man teams using mutually supporting positions in a triangular configuration with about 50 meters on a side.

7. VC Trail Watchers. The enemy trail watchers fire single shots to signal the direction of movement of a friendly unit.

8. VC Deception Techniques. The VC take advantage of the kill emphasis, employing deception techniques such as deliberate exposure at far distances, prolonged sniper fire from a position, or open smoke fire to bait patrols into ambushes, crossfires and booby trapped areas, or to steer them away from established base camps or other guerrilla facilities.

9. Enemy Jamming of Radios. The enemy normally exercises his jamming capability during critical phases of an operation such as air strikes, artillery preparations or medical evacuations. Units must be alert to switch to the alternate frequency without order.

10. VC Countermortar Techniques. The Viet Cong often fire their mortars at friendly positions when these units are firing their indirect weapons. This makes countermortar radar detection difficult and causes confusion sometimes leading to a cease fire by friendly elements in order to investigate the possibility of short rounds having been fired by friendly weapons. This practice should be carefully explained to all personnel so as to maintain confidence in our indirect weapons. It also underlines the importance of shell reporting.

11. VC Mortar Registration. The Viet Cong appear to be using high airbursts to register their mortars. They are capable of placing well-aimed indirect fire anywhere in sector without apparent pre-registration.

12. VC Use of Mines and Booby Traps. All personnel should be thoroughly briefed on Viet Cong mines and booby traps, including means of detection and methods of destruction. Extreme caution should be exercised when moving near hedges and trees. Almost all Viet Cong houses are surrounded by hedgerows on all four sides. Knowing that US soldiers will try to avoid the open clearing and move through a concealed route, booby traps are normally placed at the corners of these hedgerows. Booby traps are often placed up in trees with the ground area beneath also booby trapped. They also booby trap foxholes and shell craters while withdrawing so a second tenant runs the risk of being a dead tenant.

13. VC Markings on Booby Traps. Red markings on Viet Cong grenades, mines, etc., indicate that the ordnance is booby trapped. Normally, they use an instant fuse which prevents one from getting far enough away before it explodes; therefore, such ordnance should be destroyed in place.

14. VC Command Detonated Mines. Command detonated mines are selectively employed against lucrative targets by the Viet Cong. In one instance, several individuals passed a given site without incident but when the company command group reached that location, a command-detonated mine was exploded at the exact moment that it would inflict maximum casualties.

15. VC Mine Tactics. The Viet Cong place antitank mines along roads and trails capable of handling wheeled traffic. They also place antipersonnel mines on defensible terrain nearby so that infantrymen taking to the high ground to protect a disabled vehicle are subjected to destructive devices.

16. VC Tunnels and Fortifications. The types of fortifications found were extensive trench systems, spider holes, reinforced bunkers, and numerous tunnel complexes. In fact, the Brigade destroyed over 400 tunnels during its first month of operations. VC underground tunnels have fallen into two general catagories, classified for reference purposes as short and long tunnels. The short tunnels are 90 feet or less containing two or more firing holes and air holes with 2 or 3 routes of entry. These tunnels are mainly used by snipers as firing positions and in most cases have one or more right angle cuts away from the original position enabling the occupant to fire from a concealed position or escape if detection is probable. The long tunnels, 90 feet or longer, used as a covered route enabling a person or unit to come and go without being detected, may have secondary tunnels leading to caches, hospitals, classrooms, etc. The long tunnel normally has many concealed air holes leading to ground level. The tunnel, when used as a covered route, normally begins in Cong territory with hidden entrances or exits located

throughout its length. Supplementary tunnels have been found to run at right angles to the initial direction at the entrance point. Tunnel entrances were often extremely difficult to locate unless artillery had ruptured the covers or a soldier stumbled over the protruding wire loop handles. The type of vegetation found in the area immediately around the tunnel entrances confirmed that many of the tunnel complexes were completed many years ago. Unless these tunnel complexes are located and destroyed as a unit moves forward, the Viet Cong is capable of employing forces at any time in multiple locations to the flanks and rear of friendly elements with relative ease. Thorough search of these tunnels by the unit's trained tunnel teams prior to destruction is the only security for locating and destroying all entrances. Experience has proven that valuable documents and other miscellaneous papers are often stored in the tunnels. The tunnels were seldom booby trapped.

INFANTRY OPERATIONS

1. Leadership. The importance of good leadership at the squad and platoon level cannot be overemphasized. Priority of work in the defense must be digging in and cutting fields of fire. Alert outposts are mandatory. Force and professionalism of noncommissioned officers become vital factors when troops are tired and weary. Leaders must remain calm and firm especially during critical periods.

2. Use of Cover and Dispersion. VC will take advantage of US troops when stopped by using accurate sniper fire, unless security forces are increased and are very alert. If units must stop, personnel must use cover and stay dispersed. Open areas such as rice paddies or open fields should be avoided when moving if possible. When units must cross these open areas, it is mandatory that maximum dispersion be employed. Don't forget your base of fire.

3. Occupation of Night Positions. Never occupy the same positions during the hours of darkness that are occupied during daylight hours. Night positions should be selected during daylight hours and occupied under cover of darkness; never occupy the exact same sites two nights consecutively. Good ambush patrols with Claymore mines in front of defensive positions are mandatory.

4. Use of the Buddy System. Many friendly casualties have been caused by punji stakes, snipers firing from trees, spider holes, or by lead elements tripping booby traps. The use of two-man teams operating on the "buddy" system greatly reduced the occurence of such incidents. One man should watch primarily for punji stakes, booby traps and snipers firing from holes nearby while his buddy searches the trees and the area further to the front for snipers. This same "buddy" system should apply on defense. Always have two men in each position, especially during hours of darkness.

5. Reaction to Snipers. Immediate reaction to sniper fire must be characterized by violence, a rapid return of a heavy volume of fire and fast movement. Fire control seems to work best with about one-third of the fire directed into trees and two-thirds on the ground. The M-79 is excellent for use against likely targets in trees. In dense tree growths, grenadiers must realize that rounds do not arm if they hit branches immediately after being fired.

6. Effect of Casualties. The American soldier has a tendency of immediately going to the aid of a wounded soldier. VC snipers have capitalized on this and purposely wound a man to kill two or three others

going to his aid. The immediate response should be that of laying down a heavy base of fire, both grazing and tree spray, in the direction of the sniper and pushing forward to establish a secure area for the wounded man. Personnel cannot stop fighting to aid the wounded. Aidmen must come forward to police the battlefield.

7. Use of Anti-Sniper Teams. In operations which involved clearing and destruction of Viet Cong facilities (tunnels, foxholes, "hooches"), roving "squirrel hunters" and screening forces on the outside of established perimeter kept the Viet Cong off balance and precluded possible sniper action against forces who were relatively stationary in the perimeter conducting clearing operations.

8. Use of APC's. Armored personnel carriers have been used as ambulances and resupply vehicles with much success. These track vehicles have provided protection for wounded while expeditiously returning them to medical treatment. The supply track was able to rapidly carry bulk items such as diesel and demolitions to the operational area.

9. Marking of Tunnels and Booby Traps. Personnel of attacking companies should mark tunnels, booby traps, etc., with toilet paper or some readily available item to assist the following company responsible for destruction in locating such.

10. Use of Tunnel Teams. Tunnel teams trained by the 1st Inf Div Cml Off have increased the effectiveness of unit operations. Once trained, organic personnel have systematically searched the base camp area for suspected Viet Cong tunnels and explored and destroyed those located. Numerous documents, weapons caches, and other items have been discovered by these teams. A minimum of three (3) men are required per team. One above ground and two men inside the tunnel equipped with pistol, flashlight, telephone and wire, plus compass and bayonet.

11. Use of APC to Clear Paths Through Mines or Booby Trap Areas. Troops should take advantage of walking in APC or vehicle tracks or in others' footsteps in locations where mines are being used.

12. Recovery of Weapons. Recovery of weapons belonging to the wounded or killed is a problem requiring careful attention. Some are so engrossed with getting the wounded men to safety that the man's weapon is left on the battlefield. When weapons are loaded on medical evacuation helicopters, it sometimes becomes very difficult to regain them.

13. Use of Flares. Units must not use flares too close to their positions, thus exposing their own positions more than the enemy's. Flares must be well to the front.

14. Use of Claymores. Claymores can be used effectively in the offense in thick jungle, in an H&I role or to protect the perimeter in the defense, and in breaking contact during the withdrawal or extraction phase of an operation. On ambushes, there is a tendency to detonate Claymores prematurely before the enemy has entered the maximum killing zone. Commanders must insure that using troops understand the maximum effective range of the Claymores.

15. Use of M132 Mechanized Flamethrower. Mechanized flamethrowers, M132, have been used successfully in clearing operations and against suspected Viet Cong positions. Their principal disadvantage is the high fuel consumption rate and the time needed to return to a safe area where they can be refueled.

16. Reporting. Continued stress must be made on accurate and timely reporting. An evaluation must be made by each headquarters prior to forwarding reports in order to determine if the who, what, where, and when are included in the reports.

17. Necessity of Alertness. Leaders must be especially watchful to insure alertness of troops returning to friendly lines after an operation. Troops tend to bunch up as they approach friendly lines, thereby affording the VC an excellent target for mortar or rifle grenade fire.

18. Use of the M-72 LAW. The LAW is an effective anti-sniper weapon if used on tree lines. It is also effective for clearing buildings prior to entering.

19. Equipment to be Carried.

a. Squad leaders should carry extra insect repellent for their squad, foot powder, water purification tablets, one or two razors.

b. Medics should carry malaria pills, extra bandages, extra tags to tag personal gear, and/or weapons of KIA, WIA.

c. Squad bags to include trousers, shorts and socks for each man should be prepared for each operation in event required to be airlifted.

d. Illumination grenades should be carried to mark helipads at night.

e. Engineers must carry a maximum load of demolitions and power saws.

f. Grappling hooks should be fabricated in each company for use in extracting caches and exploring booby traps.

20. Command Groups. Command groups are readily identifiable by their collection of antennas. While there are a number of methods to camouflage these radios, the paramount requirement is to keep the number in the command group to a minimum and well dispersed. Command groups are primary targets for observed indirect fire and command detonated mines. FO teams should keep adequate distance from the commanders but should be close enough to provide immediate response. Newsmen, photographers, etc., accompanying the unit should not attach themselves to the command group and complicate the problem.

21. Use of Smoke to Mark Locations. Whenever a unit is marking a location with smoke, they should require the homing element (FAC, Airborne Observer, Medical Evac, etc.) to identify the color of smoke. The Viet Cong will throw smoke to confuse the issue or lure an evacuation helicopter in ambush.

22. Accounting for Personnel. A fire team does not move if a man is missing, a squad doesn't move if a fire team is missing, a platoon doesn't move if a squad is missing, and a company doesn't move if a platoon is missing. Make leaders absolutely responsible for the accountability of all personnel at all times.

23. Halting for the Night. When stopping at night, search out a minimum of 400 meters to the front to insure that the enemy is not observing the preparation of your defensive positions.

24. Ambush Patrols. Patrols can and should use on-call marking rounds at predetermined points along their route to assist them. Ambush patrols should plot their ambush site as a concentration and fire upon it after returning to their lines.

25. Aircraft for Anti-Ambush Purposes. Maximum use of air observation by fixed and rotary wing aircraft should be made in conjunction with troop movements. These aircraft should carry trained forward observers who are capable of the dual role of detecting and marking possible ambush sites and of adjusting artillery fire on any resulting targets. Aerial observation should be retained for the entire movement. There are examples of successful Viet Cong ambushes occurring after the friendly commander had felt that his mission was accomplished and he had no further need for his aerial eyes. Armed rotary wing aircraft should be on station until all vehicles have completed the move.

26. Battlefield Police. Nothing that can be of value to the enemy should be left behind. Even a burned-out radio battery still has enough juice to detonate an explosive charge if properly set in series. The Viet Cong will police up everything including spent casings to use against us.

ARTILLERY OPERATIONS

1. Briefing of Cannoneers. The men must be kept aware of the situation at all times. They must be well briefed on the general, special and current situations. Response has been much better when this is done. Cannoneers have been informed as to the nature of the target and the results of every mission.

2. Importance of Forward Observers Providing Information. Forward observers must send all available information to the FDC. General terms such as "VC in open" must be forgotten. Specifics, such as number (size) of enemy force, nature of activity, distance, are a must for the FDC.

3. Fire Control Techniques. No fire lines and fire coordination lines must be on firing charts and must be current. The artillery commander should be the only approving authority for fire coordination lines between battalions and may establish them regardless of maneuver boundaries.

4. Reporting of Results. Surveillance will often be negative. In order to determine full value of artillery fires, report not only confirmed results (which often will be few) but possible or probable results.

5. Fire Adjustment. For close-in firing, the first round in adjustment or an initial round in FFE missions must be white phosphorus (WP). This will insure that the fire is safe and will greatly reduce possible casualties if the maneuver element is disoriented. Be sure to apply corrections to the HE round when switching from WP. Forward observers must be prepared to adjust by sound as well as sight. During daylight hours, combined adjustments with the air OP bringing fire close to the ground observer for final adjustment have been invaluable. "Creeping" has not been a dirty word here. For close-in fires, it has been a must due to map inaccuracies and difficulties in locating oneself. Drops of less than 50 meters are sometimes necessary.

6. Counter-Mortar Radar. Counter-mortar radar is very effective but limited equipment permits coverage of only a small sector of the brigade perimeter at any one time. Shellreps/mortreps are essential and reporting upon receipt of the first incoming round is of extreme importance. Thorough training in reporting is mandatory prior to arrival in-country. Shell identification manuals have been impossible to find in Vietnam.

7. Extra Fire Control Equipment. Extra fire control equipment such as aiming posts, bulbs and aiming post lights should be carried. Toggle switches for remote control of aiming post lights are very helpful.

8. Plastic Firing Charts. Plastic target grids and firing charts shrink and expand under the temperature and humidity conditions found in Vietnam, thus affecting their accuracy. Grid sheets should be kept covered when not in use.

9. Firing Charts. 6400 mil chart. Secure 25,000mm charts since smaller charts taped together produce some inaccuracy. Bring cloth to cover the chart when not in use. Terrycloth or towels are ideal to cover the chart because when they are pulled back for a fire mission, the chart operators rest their sweaty arms on the towels thus protecting the chart. Do not try to remove the deflection indexes with each new adjusted deflection. Normally, registration is with all 7 charges and is done too frequently to move all deflection indexes. The deflection correction is applied from the stick by the computer on FFE missions.

10. Map Scales. The use of maps, scale 1:50,000 for posting the situation, friendly front liner, patrols, etc., is unacceptable as it is not sufficiently accurate to post these with grease pencil and adequately control artillery fire. The most successful system is for each LnO to have a 1:25,000 overlay which is then posted in colored pencil on a plastic firing chart that can be used as an overlay to the actual firing chart.

11. Ammunition Status. Maintaining an accurate ammunition status chart for designating lots to use and for reporting to higher headquarters is a difficult problem. Batteries must be trained to routinely report ammunition by type, lot number, amount and fused.

12. Cleaning Tubes. As a normal practice, tubes should not be oiled. A good solution for cleaning has been washing the bore with hot soapy water, and drying it thoroughly during a lull in firing. Rust is no problem if the drying is done well. Extra immersion heaters are beneficial for this purpose.

COMMUNICATIONS

1. Importance of Radio Operators. The importance of radio operators monitoring their nets at all times cannot be emphasized enough. Instructions must be passed from the sender to the commander concerned and not the operator. On extended operations, a radio operator's alertness can be sustained by commanders having an extra RTO in the command group who can carry the radio when the operator tires.

2. Selection of Communications Personnel. Dependable communications with the next higher echelon and all supporting weapons is an absolute necessity. Sharp, intelligent, resourceful men must be selected as radio operators.

3. Use of Wire in Attack. In one operation which involved seizing and securing a limited objective with two companies forward and the third company following in a destructive role, wire was used with all companies both in the attack and extraction phases with tremendous success. This reduced radio traffic to a minimum and denied the enemy who had demonstrated a monitoring and jamming capability information or interference with the orders for the operation. The enemy completely jammed the Battalion Command Net prior to the on-call preparation being lifted in an effort to delay the obvious order to execute the attack. Wire was used to issue these instructions and to order a switch to the alternate frequency.

4. Jamming. The enemy exercises his jamming capability only during critical phases (i.e., air strikes, during artillery preparations, medical evacuations, etc.). Units must be alert to switch to the alternate frequency on order.

5. Transmissions on Radio. When reporting incoming fire over the radio, commanders should disguise the accuracy of this fire as the Viet Cong at times appear to be monitoring unit frequencies and adjusting their fire based on friendly commanders reports.

6. Communications Security. Correct radio procedures, use of code words, check points and encoded map coordinates (except for enemy information) will prevent the Viet Cong from knowledge of the operation.

7. AN/PRC-25. Helicopter radios do not communicate well with AN/PRC-25's. When possible, airborne observers should use the PRC-25 or the ground receiving station should utilize a vehicle-mounted radio (Old Series). The PRC-25 is a tremendous improvement over the old series of radios. Its use has increased the man-portable communications capability of ground forces immeasureably. The use of the squelch on the PRC-25 results in poor communications with the old series of radios. Squelch should only be used at night or when on an ambush patrol.

8. Charging AN/PRC-25 Batteries. There is a tendency to forget about changing the batteries in the AN/PRC-25. The extreme heat and lack of refrigeration for dry cell batteries reduces their usefulness from a 30-day supply to ten or fifteen. Use old batteries first. AN/PRC-25 batteries often last longer than the 24-hour expectancy but new batteries should be put in radios just prior to an operation.

9. Remoting Radios. It is not desirable to remote radios into the operations center as the batteries in the remotes do not last and even new batteries seem too weak to do the job. Some units extend the speaker and headset into the operations center, however, the lack of immediate control of the volume and squelch is undesirable. The best method is to mount the radios in the operation center to spare vehicle batteries charged by a 28-volt generator. The radios must be kept on "receive only" when not transmitting to cut down on the power drain. Bring extra cable and vehicle batteries to allow flexibility in setting up communications.

10. Transmissions. Radio nets get strangled by inarticulate RTO's. Keep air open during helicopter assault. RTO's should listen to radio traffic and get a feel for what is going on before transmitting an administrative or nonessential type message.

11. Panels and Smoke. Use of "Dust Offs" and marking lines for air support missions can result in a heavy demand for smoke grenades. Companies should carry one smoke grenade per man on operations, at least two panel sets, plus all the pyrotechnics listed in current SOI.

12. Wire in Mechanized Battalion. Because of the requirement for a static defense of the base camp area, the amount of wire (WD-1/TT) organic to the mechanized battalion is not considered adequate in Vietnam. A mechanized battalion should be authorized the same amount of wire that infantry battalions are.

13. OH-23 as a Command and Control (C&C) Ship. The OH-23 is not considered a good command and control ship. It has only one radio channel available and use of a PRC-25 as a supplement is not favorable since one cannot listen to the PRC-25 handset while wearing a flight helmet. Furthermore, it is difficult to understand anyone transmitting over the radio in the OH-23.

14. Telephone Poles. Don't count on readily obtaining good bamboo lance poles for overhead wire. Many units are using long engineer stakes welded together to get the wire off the ground.

15. Telephones. Telephones are at a premium due to the needs for perimeter, base camp and operations. Get all you can. EE8's, if you can find them, will be a great help.

16. GRC-46's. This unit's GRC-46's have not been modified to accept the KW-7 so we have only off-line crypto capability. Do all you can to have this modification completed prior to deployment. Desert filters for GRC-46's are needed in this area during the dry season.

17. GRC-3-8. If you still have the GRC-3-8 series radios, try to bring a URM 32 (signal generator) and URM 48 (frequency meter) for battalion level alinement of radios. This will reduce support level maintenance downtime immensely.

18. Packing of Radios. Obtain desiccant to pack with radios for overseas shipment. (This also applies for fire control equipment and boxed weapons).

19. Frequencies. Due to the high density of troop units and the nature of the war, denying extensive use of wire, a large number of radio (FM) nets are employed. Units not converted to the new family of radios are experiencing difficulty in operations due to a sharing of radio frequencies with as many as four or five other units. The new family of radios with their extended frequency range are a valuable asset and reduce this problem to a satisfactory level.

WEAPONS

1. Taping M-14 Magazines Together. The practice of taping a second magazine to the magazine of the M-14 rifle (then turning the two over quickly and inserting the second for a rapid loading) often results in the second magazines being stuck in the ground. This gets the magazine dirty and causes malfunctions so such practice should be discontinued.

2. Maintenance of Weapons. The high evening humidity in this area rusts weapons. Clear and reload all weapons each night and each morning to prevent rounds sticking in chambers. Leaders must conduct weapons inspections daily.

3. Machine Gun Ammunition. Keep a short belt of machine gun ammunition out and ready to fire—carry all other machine gun ammunition in cans to protect from corrosion and dirt.

4. Claymore. Attempt to secure Claymore mines to objects and remove only after approaching them on flanks and visually inspecting.

5. Hand Grenades. Grenades must be securely fastened to the harness to prevent loss. They also should be taped to prevent separation of grenade body and fuse.

6. Night Firing. Personnel should aim low at night to insure hitting any enemy that may be crawling in.

7. Use of Claymore Mines. Following points are stressed in the use of Claymore mines:

a. Avoid premature detonations prior to enemy entering the killing zone.

b. Secure Claymore mines to fixed objects such as trees or stakes.

c. Secure electrical wires to legs of the mine to prevent animals from tripping the wire and separating the fuze from the mine.

d. Individuals physically receiving a Claymore should carry the hand generator in a pocket to avoid accidents. Recovery party should approach mine from the flanks making a careful visual inspection prior to movement of the Claymore.

e. Employ Claymores so that they can be well-guarded and under constant observation by friendly troops.

MEDICAL

1. Casualties to Medical Aidmen. Operation planning should include immediately replacing company aidmen who become casualties as this happens more frequently in guerrilla warfare than in conventional warfare.

2. Aerial Medical Evacuation. Aerial medical evacuation is responsible for saving more lives than any other evacuation means, however, there are multiple considerations in its use. The calling in of "Dust Offs" restrict tactical operations by curtailing and sometimes completely stopping supporting indirect fires. The scheme of maneuver may have to be altered to secure LZ's for medical evacuation. These should normally be cleared areas to the rear of the operational areas.

Dust off helicopters cannot take improvised stretchers if they are too long so be prepared to shift wounded to the stretchers that are on the evacuation helicopters.

3. Medical Evacuation in APC's. The use of armored personnel carriers in a medical evacuation role in areas subject to sniper fire and booby traps proved highly satisfactory. The optimum number of APC's that should be made available to a battalion for medical evacuation is three. Medical evacuation is best handled utilizing attached APC's moving casualties from the front lines to the field litter ambulance under battalion control to a Forward Medical Evacuation Center from where they are evacuated to the battalion aid station. Guides should be available at the Forward Medical Evacuation Center to lead the APC to the company collection point. Personnel manning this point should mark the point with smoke on order.

4. Evacuation of Dead. Preparations in the form of evacuation bags and a vehicle should be on hand in the vicinity of the Forward Medical Evacuation Center to evacuate KIA's as quickly as possible without utilizing field litter ambulances which may be needed for the wounded.

5. Assisting Casualties. Over attention to assisting casualties can sometimes detract from a unit's aggressiveness resulting in additional casualties from sniper fire which could be prevented by a heavy volume of friendly fire and aggressive maneuver to adequately clear the area where the initial casualties were taken.

APPENDIX II

"COMMANDERS NOTES - 1"

Commanders Notes - #1 was published by Headquarters, 1st Infantry Division 27 March 1966. This series of notes by the Division Commander provides an excellent insight into his reactions and lessons learned on the battlefield.

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DEPARTMENT OF THE ARMY
HEADQUARTERS, 1ST INFANTRY DIVISION
Office of the Commanding General
APO San Francisco 96345

AVID-CG

SUBJECT: Commanders Notes - 1

TO: SEE DISTRIBUTION

1. This is the first of what will be a series of Notes based on the observations of the Division Commander during operations, training and base camp activities.

2. Training. The turnover in the 1st Infantry Division through normal rotation, battlefield casualties, sickness and other causes is already high and may well increase. The turnover is greatest at the level of squad, section and platoon where the greatest number of casualties are taken and where sickness and other disabilities are the most prevalent. There is a great store of combat experience in the 1st Division, but that experience can quickly disappear. Therefore, the Division is faced with the problem of fighting and training at the same time. All commanders will devote their personal attention to training at every available opportunity. Emphasis will be at the squad, section, platoon level. Experience and lessons learned must be pushed down by brigade, battalion, company, troop and battery commanders through an imaginative, continuous, aggressive training program. Nothing will be taken for granted.

3. Operations.

a. Henceforth, no rifle company in the 1st Division will advance either in the open or closed terrain with three platoons on line. Each commander at company and battalion level will always have a reserve element in hand, under control, and prepared for immediate commitment.

b. The term, or phrase, "pinned down" is no longer a part of the vocabulary of the 1st Division. Troops must anticipate that meeting

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engagements with the VC will involve a heavy volume of initial VC fire. At this time, naturally, commanders and troops will not be able to walk freely along the battle front. However, they will not regard themselves as "pinned down" but rather will accept this condition as the normal and natural initiation of close infantry combat. Forward elements closely engaged will automatically become a base of fire. Commanders at squad and platoon level will advance their men into the base of fire positions by crawling if necessary. A heavy volume of fire will be returned by all hands and at any time the VC fire either slackens or stops the base of fire will improve its positions by moving forward--even if forward movement is only a matter of 5 meters at a time and the mode of advance is by crawling. Under NO circumstances, repeat NO circumstances will forward elements in contact withdraw in order to bring artillery fire on the VC. The base of fire will stand fast and reinforce if necessary. Contact will be maintained if necessary throughout the night.

c. Upon initial contact, company commanders will immediately commit their reserve platoons around one flank or the other and will immediately begin artillery and mortar fire to their front. In the jungle, this fire may be started some distance in front of the position and walked back toward the position until safety requires that it be brought no further. This artillery fire, even though it may be behind the forward VC elements in contact, will be continued. It will prevent the VC from reinforcing, withdrawing or maneuvering. At no time will company commanders lose control of their forward elements or battalion commanders of their companies so that maximum fire power cannot be brought into the VC position to the immediate front.

d. During the first 5 to 10 minutes of a meeting engagement, the chances are the VC will have the advantage. He will initiate combat at a time and place of his choosing--usually from prepared positions. After the first 5 to 10 minutes, the combat advantage will begin to shift rapidly in favor of 1st Division forces as additional fire power is brought to bear. The maximum casualty producing weapons are light, medium and heavy artillery and air strikes. Commanders of companies, battalions, and brigades, upon engagement, will immediately analyze the situation on the map and by visual observation and will bring air strikes and artillery fire into all areas through which the VC may be withdrawing, reinforcing or maneuvering. An ample quantity of artillery ammunition is available and will be used. I expect that hundreds of rounds of ammunition will be fired into the vicinity and on VC positions. The battalion and brigade commanders will bring in continuous air strikes and they will use imagination in the selection of targets.

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e. Once the VC is engaged, all commanders will use initiative and imagination to commit all available forces and block all possible routes of withdrawal within their capabilities. Until such times as routes of withdrawal can be physically blocked, they will be blocked by interdiction. Encirclement will be maintained until the VC is eliminated. There will be no pulling back into a perimeter at night during such an action.

f. Saturation Patrolling. Increasingly, battalions will be assigned the mission of saturation patrolling in extensive areas as large as 10 kilometers on a side. Progressively, units will learn to operate independently down to platoon level. Initially, platoon operations will be done in the daytime, pulling back into company perimeters at night; and after a reasonably short period of experience in this mode, platoons will operate independently night and day. The greatest payoff from platoon operations will be at night. The safety of a rifle platoon operating independently depends on two things:

(1) Repeated movement, including movement after dark so that VC forces cannot conduct a planned attack but rather must conduct an open tactical maneuver. This is not their most effective method of operating and during such engagements they are extremely vulnerable to artillery and mortar fire. All platoon leaders and platoon sergeants will direct and adjust artillery fire during such operations.

(2) While operating independently when contact is always imminent, platoon leaders will control and maneuver their elements so that at least a squad base of fire covers all advances across open terrain toward positions which may or may not be occupied by the VC.

g. In temporary defensive positions, two-man emplacements will be constructed so that there is a berm to the front and firing positions on either side with about a 45-degree angle of cross fire. This will permit the regaining of fire superiority without exposing each soldier to direct fire from the front when an attack is initiated by the VC with a heavy volume of small arms and recoilless rifle fire.

h. It will be a normal operating procedure in the 1st Division to position artillery batteries and single rifle companies in forward bases of fire. These positions will be moved with sufficient frequency so that they will normally not be susceptible to coordinated attacks by large forces. However, they will be subject frequently to probes and

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attacks of up to company size. The troops must be cautioned to expect and to handle this size engagement. Additionally, combat reconnaissance by platoon and company size elements will be normal. Rifle platoons are expected to be able to handle VC companies; companies to handle battalions; and battalions to handle regiments during initial engagements of 4-6-10 hours until reinforcements can be brought in.

4. Helicopter Assault Operations. The VC in the III Corps area are known to possess 12.7mm CHICOM antiaircraft machine guns, at least quad-50 machine guns and an equal number of 20mm antiaircraft weapons. It is inevitable that they will attempt at some time to spring a massive helicopter ambush by employing these weapons around a likely landing zone. Therefore, it is important that LZ preparation be conducted in such a manner to prevent the VC from conducting a successful ambush. Generally speaking, landing zone preparations have not been conducted with sufficient intensity over a short period of time to derive the maximum shock effect inherent in the artillery and aerial ordnance systems used. Furthermore, it has been customary to prepare the LZ in a sequential manner—starting with air, followed by artillery, followed by armed helicopters. Sometimes the artillery has proceeded the air strikes but this is not relevant to the problem. Henceforth, airmobile operations will be planned so that artillery will continue during the helicopter landing probably on one side of the helicopter approach corridor and the air attack will continue on the other side using either small fragmentation bombs or, as a minimum, 20mm strafing. The armed helicopters will be required to cover with their firepower both the near and far approaches to the landing zone within the approach corridor during the actual landing. The transport helicopters may either enter and leave through an extended corridor, or being lighter by the discharge of troops, make a 180-degree turn and take off downwind in the same direction they entered. Brigade and battalion commanders involved in conducting and coordinating airmobile operations will insist upon the use of these tactics and procedures for assault landings made against opposition or in areas where opposition is likely to be encountered. If landings are to be made in habitated areas, and landing zone preparation is therefore not desirable, artillery and air strikes will be made in adjacent wooded areas and in every such instance at least one PATHFINDER platoon will be put on the ground 30 minutes before the main landing.

5. If at every echelon, from squad to brigade, each commander applies the standard techniques of ground combat and utilizes the full firepower available to him, the operations of the 1st Division will be successful. If, on the other hand, commanders maneuver their troops and handle their firepower so that the full weight of the combined arms team

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is not or cannot be brought to bear, then setbacks will be experienced and unnecessary casualties will be taken. Every commander is expected to do his job in a cool, professional manner at all times.

/s/ W E DePuy
/t/ W E DEPUY
Brig Gen, USA
Commanding

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WILLIAM L PONDER JR
Major, Artillery

APPENDIX III

"VIETNAM - THE AREA OF OPERATIONS
JANUARY - APRIL 1966"

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1. Summary of Major Viet Cong and NVA Activities.

In January 1966, the number of Viet Cong initiated incidents declined slightly from the peak reached during December. In general, enemy actions in I, II and III CTZs consisted of harassments of military and civilian personnel and installations and attacks on small units and outposts. Sabotage against the railroad between Da Nang and Hue increased reflecting a possible objective of isolating Hue. In IV CTZ the VC increased attacks on Government forces and continued, by a combination of terror and coercion, to pressure the civilian populace to support the VC cause.

There were no regimental-size attacks during the month. On 8 January, about 22 kilometers northeast of Vung Tau, the VC conducted a very successful daylight ambush of a convoy from the Long Hoi Regional Forces Training Center. Heavy casualties were inflicted on Government forces. The following day, a force estimated at two battalions attacked two companies of the 3/9th Regiment on a security mission at Tau Khoi Bridge in Binh Long Province.

A typical Viet Cong action took place on 28 January in northern Quang Ngai Province when an unknown-sized enemy force attacked a Regional Force outpost and ambushed the reaction force sent from the nearby Tra Bang Special Forces Camp. In Kien Tuong Province, on 29 January, enemy companies attacked the Thanh Tri Land Development Center. During the VC occupation of the center, a Catholic Priest was beheaded.

During the 1965 (TET) festival, the VC proclaimed a cease fire for six days. In that period, 77 incidents were reported; however, there were no attacks. Immediately following the cease fire a sharp upswing in VC activity was noted. In January 1966, the VC declared a TET cease fire for 20-23 January. The cease fire in this case was stated to apply only to Vietnamese forces and civilians. There were 106 incidents during the period of which 77 were directed against FWMAF personnel and installations. It was expected that VC activity would increase sharply after

TET. In IV Corps, VC incidents did rise to the high level reached earlier in January but, in I, II and III CTZ's, VC activity failed to increase. The lack of anticipated activity may have been due in part to adoption of defensive measures by the VC to avoid engagements with large GVN or Free World Forces.

Confirmation of Viet Cong possession of 120mm mortars came during the month. The VC launched an intense mortar attack against the Khe Sanh Special Forces Camp in Quang Tri Province on 4 January. Special Forces personnel estimated that one-third of the 70-75 rounds fired in the attack were 120mm. This weapon constituted a significant addition to VC firepower.

In February 1966, Viet Cong initiated incidents declined in all categories with the exception of antiaircraft fire which increased about 15 percent. The VC conducted small scale attacks against outposts and small units in all CTZ's. Imminent large scale operations were reported, but friendly operations initiated against VC concentrations apparently disrupted VC plans and resulted in heavy enemy losses. Several hamlets between Quang Tri city and the DMZ received heavy mortar attacks. Both eastern Quang Tri and northeastern Thua Thien Provinces were the scene of major engagements between ARVN units and multi-battalion VC forces.

In mid-February, air bursts were sighted at 12,000 feet in two northern provinces. The description and altitude of the bursts is compatible with known characteristics of 37mm antiaircraft projectiles. A USMC F4B flying at 16,000 feet was fired on by an airburst weapon which continued to accurately track the aircraft after the pilot took evasive maneuvers. This would indicate radar control and a weapon of, at least, 57mm. A heavy machine gun (Goryunov 7.62 MOD 1943), not previously observed in I Corps, was captured in Ba Long Valley. These weapons, the introduction of 120mm mortars and increased reports of units in this area, provide additional indications of increased infiltration into SVN.

The area between Da Nang and Hue was the scene of a concerted railroad sabotage effort as the VC blew bridges and derailed several trains in an apparent effort to isolate Hue and Phu Bai.

In the Delta, little change in VC activity was noted. Stepped-up sabotage of Highway 4 and a number of attacks on GVN outposts and villages in Dinh Tuong Province were in line with the reported VC objective of severing this important land route between Saigon and the Delta.

In March 1966, the Viet Cong continued subversion and sabotage efforts directed at reducing GVN control of population centers and routes

of communication. Small scale attacks were conducted against outposts and units in all Corps areas. The buildup of enemy forces in I, II and III Corps Zones continued with infiltration of more men and equipment from NVN. The enemy evaded sustained combat with major friendly forces.

There were indications of a significant buildup of enemy forces in Quang Ngai Province. The 1st VC Regiment and the 21st NVA Regiment were confirmed as being in northern Quang Ngai. Another regiment was reported moving into northern Quang Ngai. Reports and unit sightings indicated that the 2d VC Regiment and the 18th NVA Regiment moved from Binh Dinh Province into southern Quang Ngai Province.

Major enemy forces located in Binh Dinh and Phu Yen Provinces avoided contact with friendly force which conducted several operations in the area during the month. To the west, in Pleiku and Kontum Provinces, reports indicated that possibly four regiments were preparing for operations to be carried out at the beginning of the wet season (May).

Enemy activity in III Corps continued to reflect the VC effort to isolate Saigon from the remainder of the country. In addition to sabotage and terrorism, there were several attacks in the provinces immediately adjacent to Saigon.

In IV Corps, there was a reported increase of conscription, increased training activities and formation of units. These activities have not resulted in an increase of VC military activity in the Delta.

In April 1966, enemy initiated incidents were concentrated along lines of communication and in populated areas. While pursuing an active campaign of low level activity, the enemy avoided combat with major friendly forces and increased his strength by infiltrating more troops from North Vietnam.

Attacks in the area of Phu Loc and along Highway 1 indicated increased VC efforts to interdict the route south of the Hue-Phu Bai area and sever overland supply to this area in preparation for the commencement of the Spring Campaign in the northern two provinces. A returnee reported some details of the VC plan for liberating the plains of Quang Tri and Thua Thien Provinces. Phase I, conducted during February, consisted of operations designed to test and probe friendly forces and resulted in over 600 VC killed. The source further stated that Phase II was about to begin and would include the employment of three regiments plus four battalions and support companies. The primary objective of Phase II operations was to be along the coast of Quang Tri Province with the coast and plains of Thua Thien Province as secondary objectives.

On 3 April, ten British 25 pounder artillery shells were fired at Cai Cai Special Forces Camp. Crater analysis indicated that the azimuth of fire was from the direction of Cambodia. Cai Cai had been fired on by mortars and recoilless rifles previously and patrols frequently contacted Viet Cong forces within five kilometers of the camp. Photography revealed heavy trail activity between Cambodia and Vietnam, ten kilometers north-northeast of Cai Cai. Elimination of the Special Forces Camps in this area would have allowed the VC to consolidate the Dong Thap War Zone (Plain of Reeds) and would have allowed uninterrupted movement across the Cambodian Border.

2. Vietnam - The Environment.

Vietnam, shaped like a huge "S", forms the east coast of the Indo-Chinese Peninsula. It is bounded in the North by China; in the East by the Pacific Ocean; in the South by the Gulf of Siam; and in the West by Cambodia and Laos. Northern Vietnam is a mountainous high region though its peaks do not reach a great height. Central Vietnam, a sort of long irregular corridor joining the North to the South, is made up of a series of small hill plains drained by relatively short streams rising in the "Cordillera of Vietnam" called Trong Son. The indented coast of headlands and bays sketches a great convex across the island scattered sea; South Vietnam is a flat country. It results from the emersion of a shallow sea bed, silted up with the deposits of the Mekong which finishes its course here in a vast delta. It can be said that South Vietnam is the magnificent gift of the Mekong.

In the North, the climate is substantially similar to that of Southern China. It is characterized by a wide difference between summer and winter temperatures and by sudden changes. The central region is the transition zone which progresses to the southern climate of a simple monsoon type. The southern area is characterized by the consistency of temperatures, the distinctly alternating monsoons and the regularity of the rainy season.

In South Vietnam, the Mekong and its wide flung arms drain all the country. The entire delta of South Vietnam is furrowed by many little streams, tributaries of the bigger rivers, and by a multitude of canals which form an excellent network for navigation and irrigation.

The area of South Vietnam covers approximately 66,000 square miles. It is approximately 700 miles long and its width ranges from 40 miles in the North to 120 miles in the South. The annamitique Mountain chain covers the northern two-thirds of South Vietnam; the remainder is a lowland delta formed by the Mekong River. Vegetation in the country consists

of densely forested highlands, grassy rolling plains in the central section, and rice fields and marshy mangrove swamps in the South. The major lines of communications are the North-South National Coastal Highway and railroad route, two East-West routes, the Mekong River, and numerous canals in the delta. These are shown on Map 1.

South Vietnam is inhabited by 15 million people of whom the Vietnamese constitute the predominant racial element. Although of small stature and frail appearance, the Vietnamese is robust and resilient. Over long centuries, he has been subjected to the Chinese influence which has permeated his character and manifests itself in many spheres. He is a man of the plains, rejecting highlands and preferring to leave the mountains and forests to the racial minorities.

3. Terrain Analysis of the II and III Corps Tactical Zones.

a. II Corps Tactical Zone - Terrain Analysis.

The geographic makeup of the II Corps Tactical Zone consists of three major types of terrain. These types are highlands, upland plains, and coastal plains.

Approximately three-fourths of the area consists of highlands in which are found hills and mountains characterized by steep slopes, sharp crests, and narrow valleys. Most peaks are from 2,000 to 6,000 feet above sea level. Conditions for ground operations throughout this region are poor all during the year due to limited lines of communications. The predominant vegetation consists of dense broadleaf evergreen forests with small areas of deciduous forests.

The upland plains consist of gently rolling grass-covered plains. Although there are few roads in the region, vehicles could move over the terrain except during the wet season.

The coastal plain is that area between the sea coast and the fingers of the two mountain chains that run the length of the highland area. Small silty deltas are formed by the streams as they empty into the South China Sea. Rice paddies are numerous and some of the larger cities are found here (See Map 1).

b. III Corps Tactical Zone - Terrain Analysis.

The III CTZ lies in the transitional zone between the lowland delta and the highlands. Almost all of the zone is flat to rolling plain. To the west of Saigon lie rice fields and marshes which are inundated during the wet season and have soft soil throughout the year. To the southeast

of Saigon, in the delta area of the Dong Nai and Saigon Rivers, is a mangrove swamp with the highest elevation being ten meters above sea level. Near Saigon are many population settlements, orchards and plantations. To the east, the terrain is gently rolling and covered with cultivated fields, rubber plantations or dense forests with thick undergrowth. To the north and northwest, the terrain is gently rolling and covered with dense forest or open forest.

Trafficability for troops is fair except for the areas west and southeast of Saigon. The heavily forested parts of the other areas and the rice fields restrict vehicle traffic to the roads (See Map).

4. The Weather in South Vietnam - January through April 1966.

a. Weather Zones.

By simplification of the weather patterns, South Vietnam is divided into three zones for this discussion. The first zone covers most of the country including the delta and southern lowland areas, upland plains and mountains or highlands. The second zone is the eastern coastal area from the NVN-SVN border south to the vicinity of Phan Rang. The third zone is a transitional zone between them. The transitional zone is not discussed because the weather characteristics are merely intermediate between those of the other two zones which differ greatly and because precise weather data is lacking for the transitional zone. (See Map 2)

b. General.

During January, the Siberian high reaches its maximum intensity and the northeast monsoon develops to its fullest extent. In February, this Siberian high begins a slow retreat northward although the flow around it is sufficient to maintain a strong northeast monsoon over Southeast Asia. Southeast Asia is still under the influence of the northeast monsoon during the first half of March. By mid-March, the northeast monsoon becomes weak or disappears entirely. By the end of March, traces of the southwest monsoon begin to appear over Southeast Asia. During April, the force of the northeast monsoon has dissipated; April is the transition month between the dry air of the northeast monsoon and the moist air of the southwest monsoon.

c. Eastern Coastal Zone.

In this zone for the months of January and February, precipitation ranged between 2½" and 6". The heaviest amounts during this period fell in February in the area around Hue and Quang Tri. The precipitation for March and April ranged from .2" to 2½". The number of days

with precipitation ranged from 13 to 14 in January, 4 to 13 in February, 5 to 16 days in March, and 2 to 7 days in April. Near maximum temperature ranged from 77 to 85°F in January and February and from 85 to 92°F in March and April. Mean minimum temperatures ranged from 66 to 72° in January and February and from 71 to 77° in March and April. Humidities throughout the period were high ranging from 79 to 91%.

d. Highlands and Southern Lowlands Zone.

In this zone from Dalat northward, precipitation ranged from 0 to 3" in January and February and from 0 to 4" in March and April. Along the Southeast coast from Vung Tau to Phan Thiet, amounts ranged from 0 to ½" in March and April. From Saigon southward into the Delta, precipitation was less than one inch in Januarh and February, and increased to as much as 7" in the Rach Gia, Khan Hang area. In March and April, precipitation ranged between 1 and 3 inches. The number od days during January, February and March with precipitation varied from 0 to 8 with the exception of Blao which had 14 rainy days in March. April showed an increase in rainy days with the number ranging from 3 at Phan Thiet to 16 at Blao. Average maximum temperatures increased from January to April. From Saigon southward into the Delta region, temperatures ranged from 86°F in January to 95°F in April. Temperatures over the rest of the zone ranged from the low 80's in January to the upper 80's in April. Kontum and Banmethout reported a near maximum temperature for April of 91°F and 90°F respectively. Dalat and the surrounding mountainous areas reported near max temperatures ranging from 70°F in January to 77°F in April. Minimum temperatures from Phan Thiet southward into the Delta ranged from 70°F in January to 78°F in April. An exception was Can Tho where the average minimum temperature was a constant 73°F. The rest of the zone had average minimum temperatures ranging from 56°F in January and February and increasing to 68°F in March and April. Dalat and the surrounding mountainous area reported near minimum temperatures ranging from 52 to 58°F throughout the period. Humidities throughout the entire period were high ranging from 74 to 88%. Saigon reported humidities ranging between 67 and 71%, a figure which is below the average for the zone.

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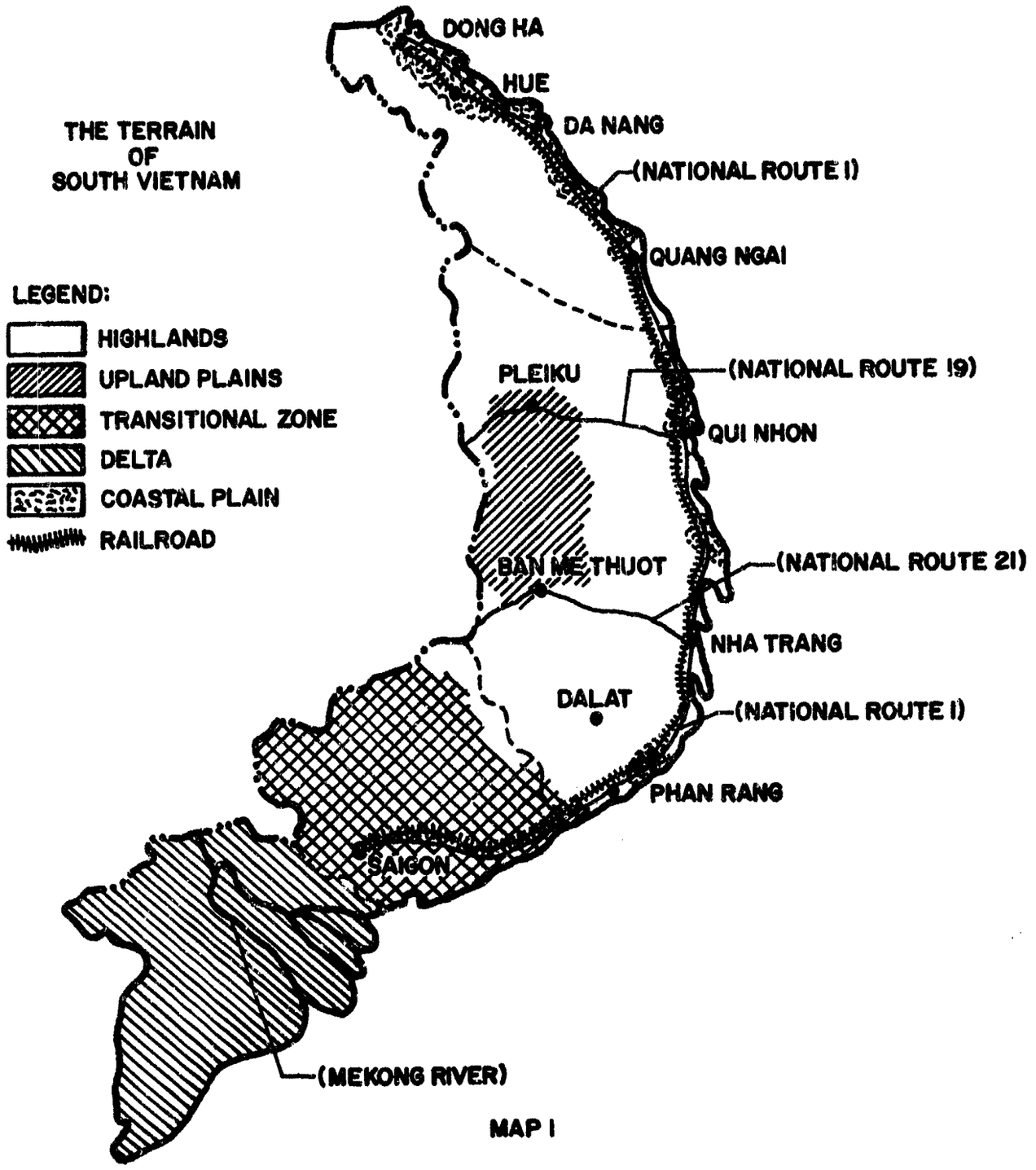

MAP I

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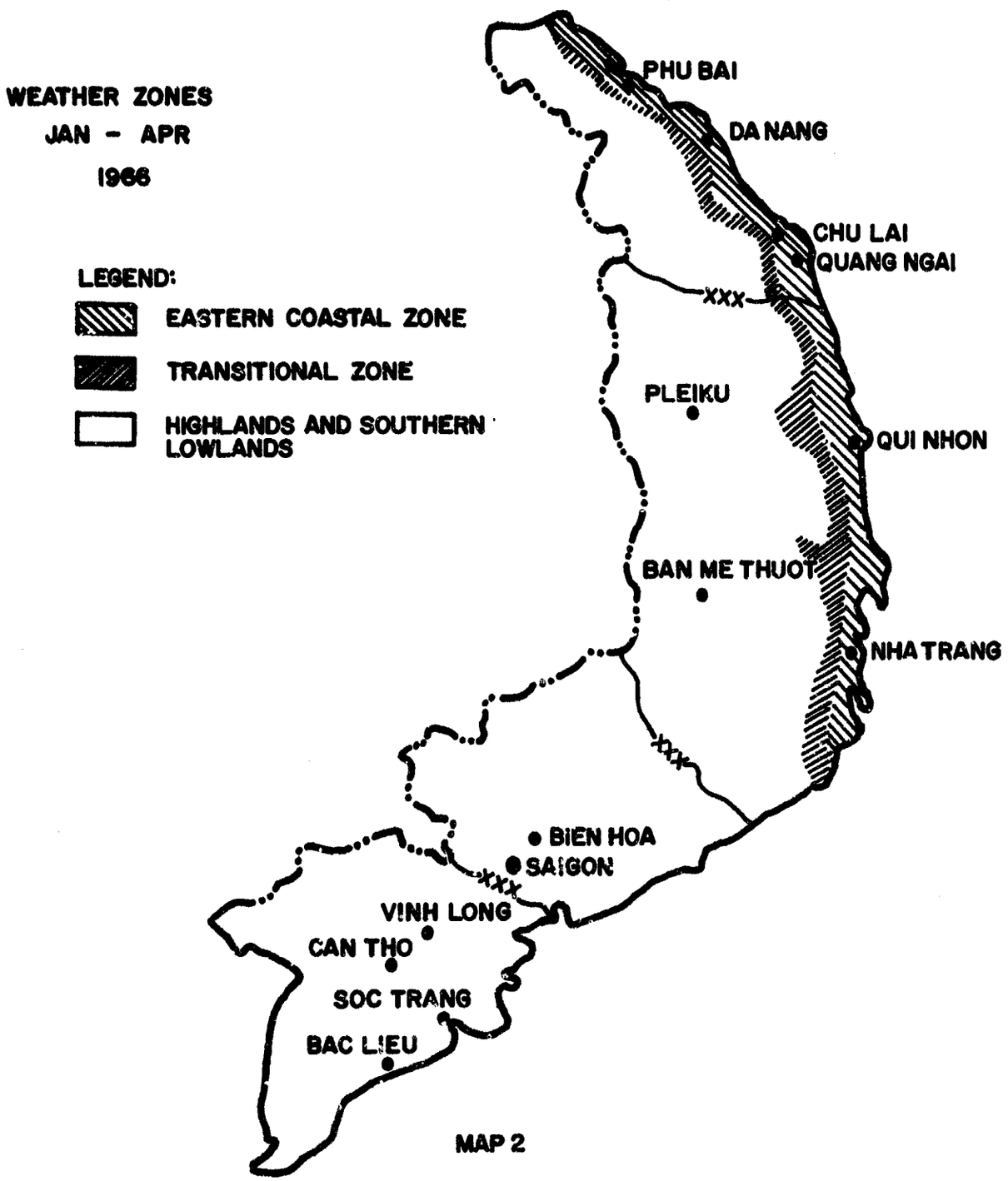

MAP 2

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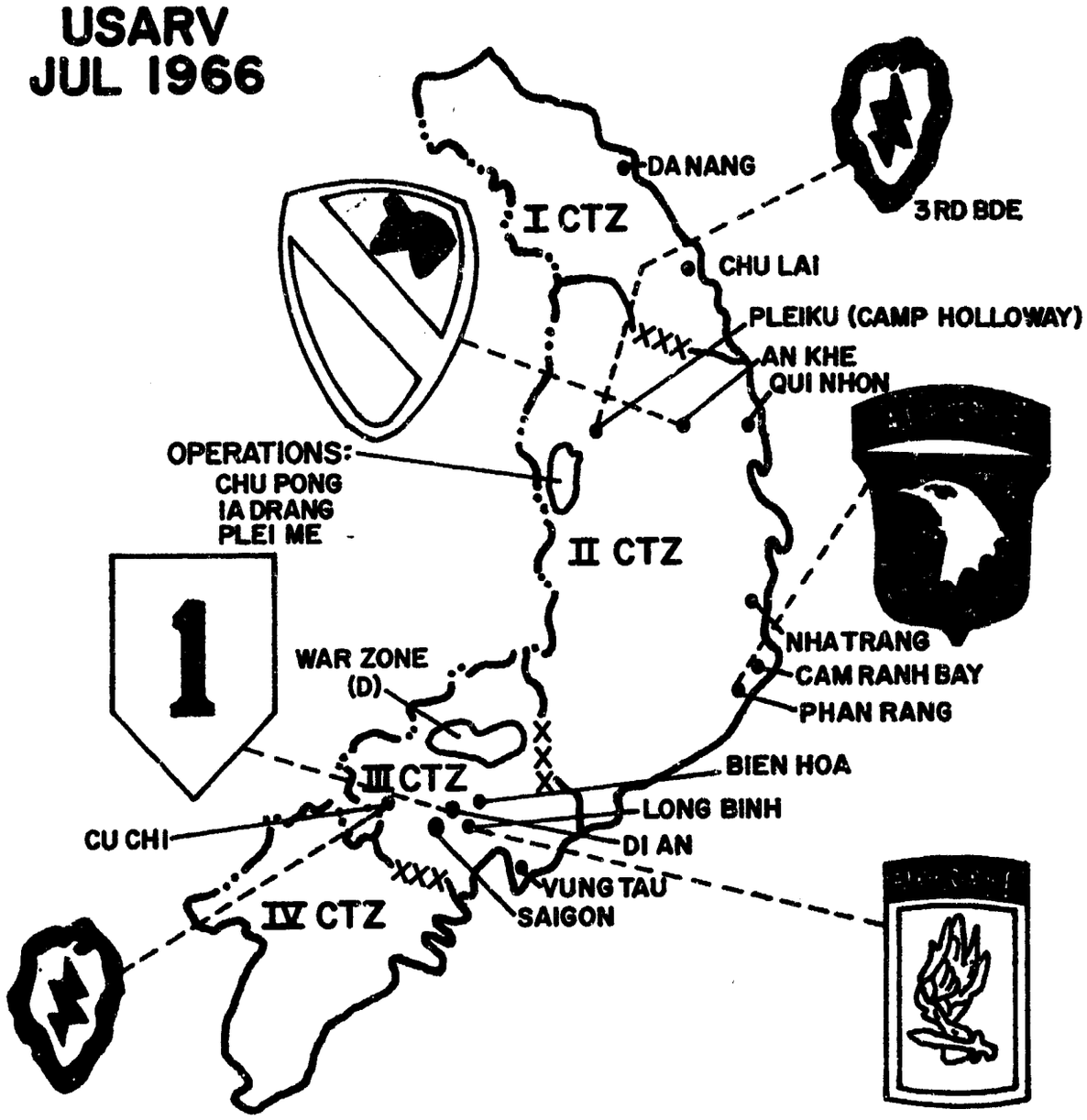
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MAP 3